IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO
EASTERN DIVISION AT CLEVELAND

IN RE:	:	Case No. 1:17-md-2804
NATIONAL PRESCRIPTION OPIATE LITIGATION	:	
	:	**VOLUME 23**
CASE TRACK THREE	:	JURY TRIAL
	:	*(Pages 5900 - 6193)*
	:	*November 4, 2021*

TRANSCRIPT OF JURY TRIAL PROCEEDINGS

HELD BEFORE THE HONORABLE DAN AARON POLSTER

SENIOR UNITED STATES DISTRICT JUDGE

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(In open court at 8:48 a.m.)

THE COURT: So the plaintiffs have offered or are offering six documents with Ms. Harrington. I assume the defendants have a bunch.

MR. HYNES: Yes, we do. We'll pass something up right now, Your Honor.

THE COURT: Why don't we start with the defendants, because it was your witness.

All right. The first one says "wait."

MR. HYNES: Yes. Let me explain, Your Honor. Paul Hynes for CVS.

The first one is the temporary restraining order from the Hansen case.

THE COURT: Right.

MR. HYNES: And our thinking there is to wait to see what happens with the *Holiday* decision. And we're still discussing with plaintiffs a stipulation on that decision and just to treat those two documents in a similar fashion because they're both, you know, similar.

THE COURT: All right. We'll hold off on that.

MR. HYNES: Okay.

THE COURT: Have the plaintiffs looked at this list that CVS is offering? Do you have any objections to any of them?

MR. HYNES: We e-mailed it last night, but it was late, and I just gave them a copy. If they need some time with it, that's --

MR. WEINBERGER: We can maybe have until the end of the day, we'll deal with it.

THE COURT: That's fine, Peter.

Have the defendants looked at the Plaintiffs' five, six?

MR. HYNES: Yes, we have.

THE COURT: Any objections to that?

MR. HYNES: We have two objections.

We have an objection to P-08415. Our objection is under Rule 602. Ms. Harrington was not on the document, and she was not familiar with the document.

And we have a similar objection to P-23330. She was not on the document, did not have knowledge of it, and I don't think Mr. Lanier even asked her questions about it. He moved on.

THE COURT: Well, "Frank Veres prescriber interview notes," who interviewed Mr. Veres? That sounds like something she --

MR. HYNES: It would have been Susan Plant and Sarah Marchand. Ms. Harrington was not in the interview notes, was not part of the interview.

THE COURT: I don't see how that comes in with

her, unless there's something I'm missing.

MR. HYNES: She also could not recall whether it was ever brought to her attention.

MR. WEINBERGER: These are part of her Compliance team that were doing this.

THE COURT: Well, it was done -- well, if it was done under her direction as part of her team, then it comes in, if these were people she was supervising. I mean, if that's the case, then it's --

MR. HYNES: It's a large team, Your Honor, and --

THE COURT: That doesn't matter.

MR. WEINBERGER: There's 30,000 pharmacists.

THE COURT: If it's done under her investigation, I mean, her supervision, then it comes in to show what her -- you know, what her unit does.

MR. HYNES: Beyond that, Mr. Lanier didn't ask her about the document. When she said she wasn't involved, he said, all right, we're moving along, running out of time. He didn't ask her any questions about it.

MR. LANIER: Oh, but I did. Oh, but I did. I referenced the interview and I referenced --

THE COURT: Let me see the document. If it was her team, then it comes in.

Let me see the other one, 08415, too.

All right. This is the March 29, 2018 interview of Dr. Veres.

MR. HYNES: Correct.

THE COURT: Okay. That can come in over objection.

This road map -- let's see, the date of this one is April of 2017.

MR. HYNES: And this is from someone not in her team. It's from someone in Retail Pharmacy Strategy. I don't know what that department even does.

MR. LANIER: Is that not Davis on that?

MR. HYNES: Davis?

MR. WEINBERGER: Tom Davis.

MR. LANIER: Yeah.

MR. HYNES: Tom Davis is not on that document. It's from --

THE COURT: Well, it says -- it says road map underlined Davis, but I don't know what -- it doesn't say -- doesn't show Tom Davis on here at all.

MR. LANIER: We'll pull that one down for now, Your Honor, and do a check on it.

THE COURT: All right. I'll just say it's withdrawn at the moment.

All right. So 00459, 23305, 20669, and 08439 come in without objection, and 23330 comes in over objection.

MS. SWIFT: Your Honor, Kate Swift for Walgreens.

Just one note on P-00459, we've requested a redaction regarding the amount of a Walgreens settlement on page 13 of that document.

THE COURT: All right. That should come out.

MR. LANIER: That's not a problem, Your Honor.

MS. SWIFT: Thank you very much.

THE COURT: I want everyone to make sure these redactions are getting done.

Okay. Well, we'll take up the defense exhibits maybe the end of the day.

So I'm thinking either after court next Tuesday and Wednesday or next Friday I'll want someone from each side to make sure you sit down with Mr. Pitts and Julian to make sure that all of the exhibits are the way they should be, that everything's in that needs to be in, everything that's been redacted has been redacted, and there's nothing that slipped in there by mistake.

MR. MAJORAS: We'd be happy to do that, Your Honor.

THE COURT: Once we finish, finish the arguments and instructions, I guess the jury will get the -- all the documents electronically.

We've got a couple minutes.

Have you given some thought to how much time you want for closing? I think it's important to get this done in one day and not stretch it over two days.

MR. MAJORAS: Your Honor, John Majoras. Before we get to that, this will be very related, I was going to share with the Court this morning our current time, I'm thinking, as we run into next week. That may be helpful to you.

THE COURT: That's a good idea.

MR. MAJORAS: As you know, we have expert witnesses today and tomorrow between data experts and a causation expert. If we were to end a tad early, my team would not object, given the reasons I said yesterday about celebration, but I'll just throw that out there.

On Monday we anticipate, the defendants anticipate calling fact witnesses, local pharmacists. We believe there will be three of them. We're trying to finalize that.

Our expectation is that our evidence will be complete Monday or at latest Tuesday morning, at least the way we see things going. If that should change based on today or tomorrow, we would let you know.

THE COURT: Okay. Monday or Tuesday morning. All right.

Are the plaintiffs planning on any rebuttal witnesses? I mean, I just want to get a sense of time.

MR. LANIER: Right now we have six and a half hours left by my count.

MR. MAJORAS: Five and a half.

MR. LANIER: So I think we've got probably 10 or 12 rebuttal witnesses we'll throw on there.

THE COURT: They're going to be mighty fast.

MR. LANIER: "What is your name?" "Pass the witness."

At this point, Your Honor, we don't anticipate needing to put on a rebuttal witness. If we do, it would be very briefly, and it would either be Dr. Keyes or Mr. Catizone. But at this point, if we ended today, right now, we would not be putting on any rebuttal.

So depending on what happens over the next sounds like today, tomorrow, and Monday, that could change into Tuesday, but hopefully we won't need rebuttal and we can finish it up with the defense case.

MR. MAJORAS: And just to point out to Mr. Lanier, you said six and a half. Based on what the Judge said yesterday, we have you at five and a half, but we'll leave it up to the Court what the count is.

THE COURT: I've got five and a half. I've got 69 and a half, so you've got five and a half, and the defendants have 23 1/2. But it sounds like they're not using it all if you're going to be finished Monday or

Tuesday morning.

Well, let's see, if we --

MR. STOFFELMAYR: It's going to be tight, but I think we'll be less than everything.

MR. MAJORAS: We do have a couple of depositions the plaintiffs are aware of. They're not terribly long though.

THE COURT: All right. So who -- you've got Dr. Murphy and Mr. Choi?

MR. MAJORAS: Correct.

MR. DELINSKY: Dr. Choi, Your Honor.

THE COURT: All right. Dr. Murphy, Dr. Choi.

Well, if we --

MR. WEINBERGER: Who do we have for tomorrow?

MR. MAJORAS: Dr. Glickman and Mr. Hill. Depending on the two days, potentially some depositions.

THE COURT: I mean, the witnesses have been taking longer than both sides had anticipated, which is okay.

All right. If we finish Tuesday, what's everyone's preference? I mean -- I don't have a strong feeling either way. I mean, if we finish Tuesday and everyone's ready, we can do the closing and instructions Wednesday. Thursday is off. And then they'd start deliberating Friday. Or we could keep our original plan and take a longer break and

just wrap everything up the following Monday. I don't know. I mean -- it's your case. I'm just --

MR. DELINSKY: Could we confer maybe on that?

THE COURT: Now, the defendants may want to take all their time. You don't have to end early; but on the other hand, if you put on what you wanted, you don't drag it out, so I appreciate that. Everyone does.

And again, it may -- I mean, witnesses have taken longer than anticipated on both sides. It's not anyone's fault. The questions have been good and, candidly, the jurors have had terrific questions.

MR. MAJORAS: Yes. It takes a lot of time.

THE COURT: It really shows they're following. I mean, some pretty detailed questions that you only have if you're really, really focused.

So, all right --

MR. MAJORAS: Your Honor, if we could maybe respond to you at the lunch break.

THE COURT: Well, why don't you -- if there's a consensus, that's fine. I mean, I'd rather do it by consensus on this, and I don't have a strong -- I mean, there are pros and cons, and it may be moot because we may go into Wednesday.

I think we're going to have a better idea at the end of the day tomorrow. We'll see, and I'd like -- because I'd

like to give the jury some sense of what the schedule's going to be next week when we break tomorrow.

So the end of the day tomorrow we'll know how much we've gone through and you'll know what you're planning for Monday and Tuesday.

MR. WEINBERGER: Can we just get some clarification, because it might -- it will help us in terms of planning.

So we have Glickman and Hill tomorrow. Anybody else tomorrow? Maybe depositions or --

MR. MAJORAS: Correct.

THE COURT: We may still be on Murphy and Choi?

MR. WEINBERGER: And Ashley?

MR. MAJORAS: Yes.

MR. WEINBERGER: And then on Monday you have three -- do you know who your three pharmacists are going to be?

MR. MAJORAS: We're still working through that and the order. We'll have that by whatever our disclosure is. We'll get it to you as soon as we know.

MR. WEINBERGER: And that's it?

MR. MAJORAS: That's all we anticipate at the moment.

MR. WEINBERGER: Okay.

THE COURT: Okay. We can bring in our jurors, and I'm going to give them those two instructions we talked about yesterday.

I will just say, you know, I know from my experience as a trial lawyer, I appreciated having some time to plan and prepare closing arguments after a long trial, and they're much better if you do, and that's why it's sort of built in that initial schedule.

MR. MAJORAS: We appreciate that, Your Honor.

THE COURT: And that's fine with me. I think the closing arguments will be better if you have a little time to plan them.

(The jury is present at 9:05 a.m.)

THE COURT: Be seated, ladies and gentlemen. I hope you all had a good evening.

Before we begin, I want to mention two things. Occasionally counsel has questioned witnesses and mentioned what prior witnesses have said. I just want you all to know that under the rules of Court, we don't permit witnesses to sit in, sit in court, while other witnesses are testifying unless they happen to be the party's representative.

And also, we don't let witnesses read the testimony of other witnesses. So I just wanted you all to know that.

And second, there have been various comments or references to running out of time or being rushed, or

whatever. I have given each side a specific amount of time, obviously equal, the same amount of time, for them to use for direct examination and cross-examination, and I haven't told either side how to use it. It's up to them how to use it. But that's something that some judges do and some don't. I happen to do it.

So I just wanted you to know that.

Okay. Mr. Majoras, you may call your next witness.

MR. MAJORAS: Thank you, Your Honor. John Majoras, one of the attorneys for Walmart.

Good morning, ladies and gentlemen.

Your Honor, at this point the defendants call to the stand Dr. Kevin Murphy. Dr. Murphy is a professor of economics, and will be sharing with us his expert opinions relating to causation and responding to some of the opinions of Dr. Keyes, Plaintiffs' witness.

(Witness sworn.)

THE COURT: Thank you.

And you may remove your mask while testifying, please.

KEVIN MURPHY

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DIRECT EXAMINATION

BY MR. MAJORAS:

Q Good morning, Professor Murphy.

A Good morning.

Q If you would, would you introduce yourself to the jury.

A Yes. My name is Kevin Murphy. I'm a professor of economics in the Booth School of Business and the Department of Economics at the University of Chicago, where I've been teaching since the early '80s. I actually was a graduate student there before that and stayed on to become a professor, so I've been teaching economics for about 40 years now at the University of Chicago.

Q Dr. Murphy, in preparation for your testimony today, did you work with me to prepare some slides that would aid you in talking to the jury?

A Yes, I did.

MR. MAJORAS: Your Honor, we'd like to use our slides and put up --

THE COURT: Okay.

MR. MAJORAS: Put up our second slide, please.

Q Dr. Murphy -- do you prefer Doctor or Professor or Mister, or what's your preference?

A Anything's fine. Dr. Murphy, Professor Murphy, Kevin Murphy, anything is fine.

Q I may use all of them at some point, so that makes it easier for me.

So Professor Murphy, what I'd like to do is take you through a little more detail, your background, how you got

to the position you're in now after having been in Chicago for 40 some-odd years.

So first, describe your personal education.

A Yeah. I grew up in California. I grew up in Englewood, California, a suburb of Los Angeles. Went to Englewood High School, and then from there I went to UCLA as my undergraduate degree, also in economics.

Learned a lot of economics from professors at UCLA, and then from there went on to the University of Chicago under their recommendation. George Stigler, who was a professor of economics in Chicago, was very influential in getting me to come to Chicago.

I then went to my graduate studies there, went to go look for a job, and once again George was influential in getting me to stay at Chicago as opposed to going somewhere else. And I've been teaching economics in Chicago and doing research on economics.

My interests in economics are mostly on social issues. I've worked on unequality, unemployment, poverty, drug use, addiction, markets for illegal drugs; all kinds of different areas, but, you know, really focused on people.

I mean, we tend to think of economics as about, you know, stock market or GDP, and stuff like that. That's only part of economics. The part of economics I've really focused on is economics of people, and that's kind of

defined my career.

Q And for those of us who may not be as familiar with the field of economics, could you just give some background on the stature of Dr. Stigler, the person who is your mentor that you described?

A Yeah, he was a Nobel Prize winner in economics, did a lot on government regulation, antitrust, economics as a whole.

The other big person in my life was Gary Becker, who was another economist at Chicago. And actually Gary and I co-taught for a long time before he passed away a number of years ago. So the main course I now teach in Chicago is a course that Gary and I co-taught for a long time before he passed away. And it's a very course that's close to my heart because it was taught before Gary by Milton Friedman, and before Milton it was taught by other people.

So it's a course that, you know, is close to what I like in economics, which is thinking about how the world works and how we use economics to understand real world phenomena.

Q And this may be fairly obvious, but the University of Chicago is in Chicago; is that right?

A Yes, it's on the south side of Chicago. We're at 55th and basically close to Lake Shore Drive, between I-94 and Lake Shore Drive.

Q Why don't you just briefly brag about your school in terms of its position in the world of economics.

A Well, we like to think it's the best place in the world for economics, but, you know, we've done well over the years in economics, won a lot of Nobel Prizes, a lot of other prizes in economics. But we always pride ourselves on kind of having a strong approach to the subject.

And again, what drew me to Chicago was, again, the kind of work that people did that was really real world focused, focused on how the world operates. A lot of -- some parts of economics gets very abstract and very far away from actual world, and Chicago to me always epitomized the approach that we're here to study the world, not just to study the blackboard.

Q As a professor at the Chicago -- at the University of Chicago, what types of classes do you teach and have taught?

A Well, like I said, I'm in both the business school and in the economics department.

So in the business school I teach an advanced microeconomics class, which basically students have a choice to take the regular class or take an advanced class. So I teach the advanced class there.

I try my best to teach the same material I teach in my Ph.D. class, but I have to teach it differently because it goes from an everyday audience which doesn't have the same

background. Hopefully I'm successful with that. I try my best to do a good job.

My other class is a Ph.D. course in economics for the beginning Ph.D. students in Chicago. So everybody who comes in in our Ph.D. program, this the first micro-course they take. And like I said, it was taught by me and Gary, and before that it was taught by Milton. It's an important part of their Chicago education.

Q I don't think we need to dive too deeply into this, but you talk about microeconomics. I assume that's in contrast to macroeconomics.

What's the difference?

A I don't understand "macro," so that's the big difference from my point of view. I've always been a little confused by macro.

But micro is really two things, the study of individuals, how individuals behave; try to understand, you know, motivation of individuals, also motivation of firms. And most importantly, about markets, how markets work. And markets are a really important concept in economics. They sort of determine how the parties interact, whether they're individuals or whether they're individuals and firms. And, you know, so we study kind of what determines the outcomes that we see.

And that is going to extend not just to things you

think of the traditional economics venues, you know, we talk about things like, you know, I've written papers on addiction and papers on markets for illegal drugs. Social phenomena, Gary Becker and I wrote a book on social economics that tries to talk about the social side of people's lives. And, you know, for a lot of decisions, what you do is not just determined by the price you pay at the store. It's also determined what people you know do, how the environment around you acts. And that's also part of economics, sort of embedding people in a social environment.

Q As we can see on the slide, you've published quite a bit. You have 80 articles in scholarly and professional journals. Rather than going through those, could you explain the significance or the importance to a professor about publications. Why does that matter?

A It's how you keep your job, that's one. To me, that was never the big story. It was it's how you get your information out to people about what you're doing.

And there are really two outlets a professor has for influencing things. One is through your publications, and the publications are read by other people in the profession; the other is through teaching.

For me, I put a lot of emphasis on both. These days, in fact, I probably put most of my emphasis on teaching. I like teaching economics. I teach those two courses we

talked about, but I also teach a summer camp which, you know, as it gets -- it's a summer camp for Ph.D. students from other universities around the country, and they come to Chicago, and they get a one-week course on how we do things in Chicago.

That's something I'm very proud of, that we're able to teach not just the Chicago students but students from around the country about how we approach things and how you use economics to address real-world problems.

Q You mentioned before, and I can't recall whether you said specifically publications, but you mentioned before addiction, the study of addiction and illegal activities.

Have you written articles related to those?

A Yes. We wrote kind of a more theoretical piece on sort of using economics to kind of understand addictive behavior. And then we wrote several empirical papers looking at cigarettes and the consumption of cigarettes, and trying to understand how a model like that could be used to understand the evolution of the cigarette marketplace over time.

We also wrote papers on markets for illegal drugs and things like that.

Q You note here that you are a co-author of a book called Measuring the Gains for Medical Research: An Economic Approach.

What is that about?

A That's about, you know, trying to assess the improvements in people's lives that have come from improvements in health.

You know, again, as an economist, one of the things people always focus on is how we become richer as a society. So as we said, if you compared 1900 with 2020, we're way richer in 2020 than we were in 1990. But the other big part of it is we live a lot longer today and we're a lot healthier than we were in 1900, you know. And that's a gain that's, you know, equally important actually.

If you measure what people value at, the gains in longevity over that long period of time parallel or maybe even exceed the gains that people have gotten from being richer, and, you know, you want to count that.

And most measures of economic output don't measure kind of the longevity part of that story. We're a lot better off as a society because we've gotten both healthier and wealthier. And those are both things that matter to people.

Q In addition to your role as a professor of economics at the University of Chicago, do you have any other teaching positions or activities?

A Yeah, I mean, I have a small position at Stanford University in the Hoover Institution, where I do a little

work there. I also work with a consulting firm, Charles River Associates, where I worked on consulting matters like this.

I also have a woodworking business where I don't do so -- you know, we make furniture, we have our own sawmill. That's -- I'd love to do more of that. I don't do as much of that as I'd like.

Q What is the Becker Friedman Institute?

A The Becker Friedman Institute is an institute at the University of Chicago to support economic research. It's named after two of the people I talked about earlier, Gary Becker and Milton Friedman, who are both professors at Chicago.

I'm affiliated with the Becker Friedman Institute. For a while I was one of the directors. I've now limited my role there. I'm on the kind of human capital side that we call it, which is really about people. So I'm kind of in the people part of that institute today and work with the Becker Friedman Institute in that capacity.

Q And you also have a position with the National Bureau of Economic Research; is that right?

A I do.

Q What's that?

A I've been affiliated with the -- I think people usually call it the NBER, National Bureau of Economic

Research. I've had an affiliation with them since the early '80s, so again, about 40 years working with the NBER and their various programs.

Q So I'm going to give you another little opportunity. I'm actually going to ask you to do it, to brag on yourself a little bit. You note some awards that you've received on the slide.

Could you describe what those awards are and the significance?

A I guess. I won the John Bates Clark medal, which at the time I won it was awarded every other year to the outstanding American economist under the age of 40. Obviously that was a while ago, because I'm not even close to under 40 today.

But I won the Clark Medal, which is a very prestigious award in economics, because it was only awarded to a single recipient but also awarded every two years. It's now awarded every year, so it's a little watered down in terms of its value today. A little excess supply in some sense of Clark Medal winners. All of us who had won before kind of opposed that expansion, but, you know, it is what it is.

I also won a MacArthur Fellowship, which is not specific to economics. MacArthur Foundation awards fellowships across a wide range of things, not just academics; musicians, artists, academics.

I won as an economist for the work I had done and particularly the work on the social side of things for social issues and that. That was what they cited in their citation for the MacArthur.

I also won the Kenneth Arrow award for outstanding paper in health economics, which is about measuring the gains to longevity.

Q And then last question on some of your background. You note here that you are a fellow of the Econometrics Society and a member of the American Academy of Arts and Sciences.

What's the significance of those to you in your profession?

A Well, those are both elected positions. You have to be nominated, and then people have to elect you to be a member. So you know, there's some prestige that comes with being selected for that.

Again, the Econometrics Society is basically in economics the American Academy of Arts and Sciences; again, much broader. It's across all the scientific fields.

Q You had mentioned a moment ago that you do consulting work for a firm called Charles River Associates. That's also known sometimes as CRA?

A Yes.

Q What does your work focus on when you're working with

Charles River Associates?

A I would say the biggest area I tend to work in is actually antitrust. I do a fair amount of work in antitrust. I also do some work in damages. But, you know, I work in economics broadly, so there's a number of different types of issues I work on at CRA. And that's very much in keeping with my view that economics is a broad subject that's meant to be applied, so I try to apply it as much as I can to a wide range of things, and CRA is a good place for doing that.

Q So if you put together all the things, the activities that you do, including your woodworking, where would you say the bulk of your time is spent these days?

A School would be the bulk of my time. School is the biggest use of my time. You know, I'm at my woodworking outfit probably the next-most amount of hours, but a lot of the time I'm there I'm doing something else, I'm not really doing woodworking. I'm on the phone working on either school stuff or CRA stuff.

So I would say second-most time spent would be at my woodworking outfight, but the actual amount of time I spend woodworking is very small, probably 10 hours a week, something like that.

Q As you heard me say, we plan to ask you some opinions involving your expertise.

Have you ever testified as an expert in prior cases?
A Yes, I have.
Q Can you tell us how many?
A I don't know the number. I've probably testified in, you know, 20, 25 times in court. I've given a lot of depositions. So something on that order of magnitude. I haven't really ever added it up.
Q Have you ever testified on behalf of a government or government agency, either state or federal?
A Yes, I have. I've testified for the FTC in a trial involving a merger, an antitrust merger.
Q And in addition to the work that you're going to talk about today, have you done other work related to other opioid cases?
A Yes, I have. I believe this is the sixth of the opioid cases I've worked on. I think I've worked on six over the last several years.
Q And the folks who hired you in those cases, did they include distributors?
A Yes. I have worked for distributors I think in most of the cases I've done. I think this is -- you know, this is a case involving pharmacies, but most of the work I've done has been on behalf of distributors.
Q And have you ever been engaged on behalf of manufacturers?

A No, not for purposes -- I've been engaged by pharmaceutical companies on other matters, but not on opioid-related matters.

Q Let's talk a little bit about your compensation in these cases.

As an expert, we have -- the defendants have retained you and compensate you for your time; is that right?

A Yeah. I am compensated in two ways. I'm compensated directly for the time that I put in, that would be the hours that I supply; as well as I get some compensation based on the billings of people at CRA who do the, you know, back office, and help me with my work on all the cases, not just the opioid cases.

I do a lot of -- I have a team of people at CRA who work with me and have worked with me for a long time. You know, many of them have been with me for 20, 30 years, but most of them have been there quite a while.

Q And the type of work that you do, is it -- did you frequently work with other people at a consulting firm?

A I always have. I mean, you know, there's a lot of work that needs to be done, just like I would -- university work, I'd work with other people at the university.

On consulting work, we work with a team of people who help you with your work. And having a great team is incredibly important. I mean, it's really hard to do

anything, really, of this type without having a good team of people.

Q And we're going to talk a bit about the report you produced in this case. It was approximately 176 pages long; is that right?

A That's a funny approximation. 176 is pretty exact. I think that's -- that seems right to me. I would have said, you know, 170 pages or so, you said 176. I'll take your word for it it was 176.

Q Who wrote that?

A My staff and myself. We worked on it together. It's not something that I would be -- I would do simply by myself.

Q But in terms of the opinions you've reached and the conclusions you reached, whose opinions and conclusions are those?

A Those are my opinions and my conclusions, you know, and my staff helps me work on developing, expositing, evaluating the data and all the things you need to do to reach those opinions. So it's really a team effort to do the work behind the opinions, but ultimately those are my opinions.

Q So in terms of the amount of compensation that you expect, and it's because you're here today we don't know the final, do you have an estimate of the amount of compensation

that you will anticipate in this case both from your time and some of the time that you get out of CRA?

A Yeah, I mean, in terms of my time on this particular case, as of the end of September it was about $40,000, I think. I've obviously done work since then, so it will probably be -- it will be in excess of that, maybe 60, 65,000, something like on that order of magnitude. Maybe a little more. I haven't totaled that out.

Q Does that include the additional compensation you may receive related to the work that others are doing for CRA on the opioid litigation -- on this litigation?

A No, it doesn't. So the amount I would have received based on other people's time and efforts would be for this case I believe about 300,000 as of the end of September. It would be higher than that, again, since they've done some work since then. But proportionately-wise, more of the work recently would have been mine because I'm the person getting ready to testify.

Q If we look more broadly at all of the work you've done in opioid litigation, do you have an estimate for the amount of compensation you're receiving related to your work and the CRA work?

A Yeah, I would say my total, I believe, as of the end of September, which is the last total I know of, was probably about 350,000, I believe, my direct compensation;

and then compensation that flowed through CRA for back office work would have been about 1.8 million.

Q Do you consider yourself to be an expert in the areas of health economics, labor economics, and data analysis?

A I do.

Q And are all the opinions that you'll be offering today based on to a reasonable degree of professional certainty in your areas of expertise and experience?

A Yes, they are.

Q And I'm going to ask you as you have further discussions with us today and you offer your opinions that you only offer opinions that are based to a reasonable degree of certainty regarding your profession and your experience. Okay?

A I will do that.

Q All right. Why don't we start with telling the jury, what were you asked to do in this case?

MR. MAJORAS: And if we can go to our next slide, please.

A Yes. So I was asked in this case to provide my opinions really on really two things. One is the increased use and misuse of prescription opioids, so that's focusing on prescribed opioids and what -- you know, how do we understand the increase in use and the increase in misuse that occurred over time.

And secondly, the increase in misuse of and mortality from illegal opioids, in particular heroin and fentanyl, which has really been a big part of the story of what we've seen in Ohio and these counties in particular, but the United States as a whole over the more recent years.

So I'm going to talk about both of those periods of time, kind of the growth and subsequent decline actually in the use of prescription opioids and then the subsequent increase in the use and misuse and mortality from illegal opioids.

Q And are your opinions going to be very broad nationwide or are they going to be more specific as well?

A Well, I think we're going to learn by looking at both. So most of what we're going to talk about we're going to focus on Ohio, a lot of what we're going to look at, but we're going to look at Ohio in a broader context of what's going on in the U.S., because I think if you compare, for example, the eastern U.S. to the western U.S., you can learn some things about what's going on.

Our interest, of course, is what's going on in these counties and what's going on in Ohio, but that doesn't mean you just want to analyze that, but that's going to be our focus. We're trying to learn about the local area, but sometimes it will help to bring in information more broadly.

Q So you made it very clear that you teach in Chicago,

and I presume live in Chicago. How do you go about looking at the two counties in this case, Trumbull and Lake Counties, as you prepare your opinions?

A Well, I guess I start -- you know, when I first heard about, you know, these were the counties that we were thinking about, I thought back to work I had done over a long period of time which looked at some of the issues that have arisen, particularly for the less educated individuals in our society over time as the economy has changed.

We've had big changes in our economy, really starting back all -- you know, as far back as 1970, and many of them accelerated around 2000, that, you know, where outcomes were tough for a lot of people. And in this part of the country in particular, really owing to the fact of the economic base that existed here. It's largely, you know, a big manufacturing base in the Midwest, upper Midwest in particular.

So I guess that's where I would have started, you know, thinking about putting them in that larger social context.

Secondly, we've had long-term increase in drug use in the United States. It predates the opioid crisis. It's continued with the opioid crisis. So I've tried to understand that side of it too. So those are really two of the key ingredients I started with.

Q We also asked you to take a look at causation or causal links; is that right?

A Yes.

Q And what was that -- what part of your assignment did that involve?

A Well, I guess my understanding -- and again, I've not read the testimony, as instructed. That was not what we were supposed to do.

I know though I did read Dr. Keyes' report and other plaintiff reports in this case, so I do know what they testified to in those reports, you know. Whether -- I didn't hear what they did or I haven't read what they said in court, but a big part of what they look at is the growth in what they call the supply of opioids over time.

And I think this is a question well suited for economics, because economics really looks at outcomes like that, you know, how -- what determines how much quantity of opioids would be consumed or sold, and what would happen if, as happened in the real world, things change and other drugs come into the United States in a later period of time, how that's going to affect outcomes.

So I'm going to address that supply issue using the tools of economics.

Q And you mentioned Dr. Keyes in particular, who was one of the Plaintiffs' experts who testified earlier. I'm going

to ask you as you're discussing -- as you're talking today to assume that Dr. Keyes' testimony was consistent with the report and the deposition that you've seen, okay?

A Okay. I'll do that.

Q So if there's something specific that I want to ask you about that may be different, I'll try to make sure that point is clear.

Fair enough?

A That's fair.

Q Okay. So as you got your assignment, what do you do and what do you look at as you prepare your work and reach your conclusions?

A Well, there's really two things you try to do as an economist. One is gather data so you can see what's going on in the world. The other is think about the underlying economics, use what you've learned and studied as an economist to interpret that data in a way that's helpful for answering the questions that are on the table.

So in this case what I tried to do is understand the growth in the consumption of prescription opioids that occurred let's say pre-2010, the factors that led to that, how to think about that from an economics standpoint, and then look at the growth in illegal opioids that really dominates the last 10 years or so, and what's behind that, how is that related.

And then ultimately try to link it back to say, well, geez, what does that say about the issues in this case. Is the plaintiffs' analysis really useful for thinking about what they say the, you know, oversupplier, supply side factors driving things. And that's where I'm going.

Q When you talk about data that you use, we've had some testimony from some folks who really look at spreadsheets and numbers. Is that all you're looking at?

A No. I think we -- you know, numbers are part of what we call data, but there's a lot of other things that we look at; more qualitative data, for example. But, yeah, numbers are a big part of it.

And, you know, we use statistical programs, not just spreadsheets, to analyze the data. We do things called, like regression analyses and things like that that, you know, sound complicated, but ultimately they're really just trying to parse the data and understand what the data have to say.

I'll try to do the best I can to explain that today.

Q So when you say qualitative data or qualitative analysis, I forget which it was, what do you mean?

A Well, I mean, you can't always put numbers on things, right? You can't always -- you can't always put numbers, but you can look at, you know, directionally how things moved, how people act; even sometimes what, you know, the

accounts that people give of what happens.

Now, it's always a little tough because they speak in their language and you speak in yours, so you have to kind of do a good translation, but you don't want to ignore kind of the more softer things as well.

Q I hope you speak in my language. If not, I will ask you for clarification from time to time.

I'd like to now turn to your conclusions, the opinions that you reached after all of your analysis and looking at information. And you have them on this slide in front of us.

What I'd like you to do is just simply go through those. If you want some explanation, please do, but we're going to cover them each in some detail.

A Yeah. Number 1 is really important. And number 1 is, you know, when I read reports, I heard people -- I heard like Dr. Keyes and others talk about oversupply, the growth in supply, and then their measure of the growth in supply was just the quantity that people consumed.

And the first thing as an economist, I see the quantity consumed going up, that doesn't tell me that was some supply side story of what drove that, because the quantity that we see consumed is determined by both supply and demand. You'll see quantity going up even if the supply side of the world doesn't really change and just people are

demanding more of something.

And so you've got to include both demand and supply factors; that is, measuring the quantity consumed is not a way to measure what's going on in supply per se. It's really a measure of just the outcome determined by both supply and demand. And that's important in this case because there's good evidence that it's not all about supply, that in fact there's -- there are demand side factors that were quite important in this case.

Some of those demand side factors are very economic in notion -- in nature, prices and how much people have to pay, costs went down for many people. That's going to drive up the quantity. But other ones are social in nature, that is, you know, some of those factors I talked about before. Distress that people face changes their demand for various things, including prescription opioids, as well as the illegal opioids.

Q We have heard the term "oversupply" in discussing opioids in this case. What is oversupply from an economist's perspective?

A Well, I don't know. I mean, there's really not a well-defined definition of oversupply. I think in economics we tend to think about supply and demand, and you have a growth in supply and you could have a growth in demand.

Either one of those would lead to a growth in the

outcome in terms of quantity. That is, we could have more gasoline consumed in the U.S. either because people demand more gasoline than they used to or because somebody discovers a bunch of oil and then we produce a bunch more gas than we would have. You can't tell simply because the amount of gasoline consumed goes up that it was a supply story as opposed to a demand side story.

And that's kind of the fundamental, I think, part where I would say that Dr. Keyes' kind of analysis is inconsistent with a solid economic analysis. She's not an economist so it's not surprising, but that still means you have to think about those broader issues to really interpret her results.

Number 2, this gets back to kind of this what I've done a lot of in my research, is you can't just look at the narrow picture. Like we're going to talk about this later, but it's important to realize that, you know, you could say, well, geez, prescription opioids are -- you know, how does that affect other outcomes. But if you restrict prescription opioids, people are going to respond. They're going to do something else.

That is, people are people. They're not rocks. You know, rocks, you move them over here, they stay where you put them. People, they have a mind of their own. You have to take that into account. And that's going to turn out to

be important in this analysis.

Q And then finally, your third conclusion, what is it that you were trying to communicate here?

A Yeah, that in particular, if you want to understand the growth in heroin and fentanyl, you've really got to understand evolution of the illegal drug market in the more recent period, and really the innovations that happened in that market with the introduction of fentanyl.

And also some of what I talked about before that, you know, the growth of the heroin and fentanyl deaths isn't all about opioids. A lot of those heroin and fentanyl deaths are people dying who are also consuming nonopioids, whether it's cocaine or other drugs. So it's, again, trying to say, "Well, that's all about opioids," I think is missing the point.

Q You mentioned that Dr. Keyes is not an economist. I can imagine, and I've not heard her say this, but I can imagine her saying, "Well, you're not an epidemiologist."

Why is it that you're here to talk to the jury about these issues?

A Well, look, I'm not here to talk to you about the epidemiological issues. I'm here to talk about the broader issues that determine the outcomes. And the key point is economists can incorporate some of the things that go into epidemiology but also can bring in a lot of other factors

and a lot of other elements of the analysis that I think are important.

Because it's not all about how is A related to B, you've got to take account of C, D, E, and F, that are also key parts of the equation. And as an economist, that's kind of our game, that's kind of what we try to do, is incorporate not just biological factors or engineering factors, but also kind of human-related and other market-related factors.

Q You talked about the A, B, C, D list of things that an economist can bring to the table. Do you have in mind specific tools that you have as an economist that you think will be helpful here?

A Yeah. I think one of the biggest principles economics always talks about is substitution, that is people can substitute one thing for another.

And for example, in this context, if prescription opioids become less available, fewer people will follow that path because there's fewer available; but at the other hand, more people will follow other paths.

So if I'm somebody who's looking to abuse drugs, if prescription opioids aren't available, I'll go in another direction. And one of the directions you may go in would be to initiate on illegal opioids, like heroin or fentanyl. And you could say, "Well, geez, that's a theoretical

prediction of economics," but it's also an empirical reality that over time, more and more people are initiating on heroin and fentanyl as opposed to using prescription opioids.

And so if your analysis is limited to a link between prescription opioids and illegal opioids and you ignore that other pathway, you're missing a very important part of the story. You have to take that into account to understand the overall impact.

I liken it to like TV. I have a colleague who actually worked on this problem. It's a really interesting problem. For example, I do a study and I show that kids watching TV -- and I do it in a very controlled environment. I show them a TV program and I measure how they respond to that TV program, and I conclude that TV has some adverse effects on people. And then you said, okay, based on that, I'm going to take away people's TV and I'm going to get rid of those adverse outcomes.

Well, the first thing an economist would say, look, I can't tell you whether that's a good idea or bad idea until you tell me what the kid is going to do while he's now not watching TV, because he's going to do something rather than watching TV. And if what he's going to do rather than watch TV is read a book then I agree with you, that's a great idea.

If what he's going to do is go out on the street and get into trouble, I'd rather have him watching TV. That's not great, but being out on the street is worse.

So you've got to think about that. You've got to think, what's the alternative. An economist is all about that. That's the first lecture class always is about that, got to think about the alternative. And that's true here too. You've got to think about how the broader impact is going to be.

Q As we dive into your opinions, let's talk about a few economics terms, some of which you've -- probably all of which you've used already, so we can be sure that we understand what you're saying.

You've talked about supply, demand, and output. Can you tell us to the extent you already have, I think supply you may have mentioned, tell us what those three are and what their difference is?

A I think it's easiest to think about in terms of my gasoline example. That is, we discover a bunch more oil and gas prices get cheaper and people buy more gas because it's cheaper, you'd say that's a supply side change. We've increased the supply of gasoline, and that induced people to consume more.

On the other hand, if people move to the suburbs for another reason and now they have to drive a lot further to

get to work, you'd say that's a demand side factor that caused more gasoline consumption. And you couldn't say that it was the discovery of oil that led to more gasoline consumption if it was because people moved to the suburbs.

That's really all it's about. You measure the quantity, you have to realize that doesn't tell you where it came from.

And so you can't just say quantity went up, therefore we have more supply. Well, no, it's really you could be measuring what actually was driven on the demand side.

Q And have you looked at the demand side factors when it comes to opioid use?

A I did, and I talked about some of it already, but there's some I haven't talked about, so we'll go through those.

Q You have here "Output." What is output and how is that different than supply?

A It's the quantity. It's the result of supply and demand, right? It's what I said, it's enough gallons of gasoline that we consumed or number of opioids that people consumed. That's output.

Supply and demand gets to the factors that underlie why, for example, that quantity might have gone up or down over time.

Q In this slide you talk about an independent factor.

Can you explain what you're relating -- what you were trying to relate to the jury here?

A Yeah, just this point, that when you look at output, it's not clear you're measuring supply. You're measuring the interaction of supply and demand side factors.

Q Let's go to our next slide.

This slide you have, "Growth in medical use of prescription opioids." What analysis did you do in this respect?

A Okay. First off, you know, and I'm sure the jury has seen these facts, I mean, if you look at when prescription opioid use in the United States grew, it would be in Ohio and in these counties it would be that period up to, say, roughly 2010 or so, there was an expansion in prescription opioid use and some expansion in abuse over that period as well.

So that's what I mean, it was about the prescription opioids as distinct from the illegal opioids, like heroin and fentanyl, that were really a big part of the later story. They're going on in the earlier period too, but this analysis was about the prescription opioid side.

Q Fair to say as an economist you're going to be compelled to show us graphs of supply as you testify today?

A I will smile, you may frown, but I like graphs, and it's one of the ways economists try to show people what

they're talking about.

Q So as you talk about the growth, what were some of the changes you analyzed?

A Well, I mean, one was -- and, you know, this is a very economic factor -- if you make it easier for people to get, to pay for prescription opioids, that is, you expand, for example, prescription drug coverage, economists -- any economist worth his salt would say, if you make it cheaper, make it easier for people to get, people will generally consume more.

And we did see that, and one of the big factors that happened in the early 2000s was Medicare Part D. Medicare Part D was prescription drug coverage for Medicare recipients. It was put in place because, you know, many people felt at the time that, you know, prescription drugs were expensive, people were having a hard time paying for the prescription drug coverage that they wanted and need, and Medicare Part D came in to help people pay for it.

And not surprisingly, when we came in and helped people pay for it, they used more. And, you know, that came as no surprise to economists. I don't even think it came as a surprise to the policy makers. I mean, after all, the policy makers put it in place for exactly that reason. They put Medicare Part D in to help seniors afford prescription drugs.

So when you see quantity go up, you don't want to think that was an unintended consequence. It was really an intended consequence of the policy, was to expand people's access and use of prescription drugs. So that's one of the things.

And opioids are among those prescription drugs, but the expansion occurred in other drugs as well.

Q When you talk about Medicare Part D, that's the Prescription Drug Improvement and Modernization Act?

A Yes.

Q When was that passed, do you know?

A I think it comes in in around 2006 or so. It was talked about before that, in 2003, but it kind of has worked its way into the system I think by the time you get to 2006.

Q And do you have any opinion as to whether the passage of Medicare Part D had any impact on prescribers?

A Oh, it did. I mean, prescribers are not immune to the financial conditions of their patients.

Q What do you mean by that?

A Well, I mean prescribers, you know, one of the things they can say, look, I can prescribe you this drug, it's going to help you, but -- and it's not going to cost you very much because it's covered under your prescription drug coverage.

I mean, prescribers, you know, the other side is, you

know, when -- this was an issue that motivated Medicare Part D, is even if drugs are prescribed, people still have to fill those prescriptions. And if they're very expensive, you know, people don't always fill their prescriptions if they don't have -- they feel like, geez, that's a lot of money, I don't think I can really afford to do that.

Indeed, those stories were some of the motivations for Medicare Part D, right? It didn't happen in a vacuum. It didn't fall out of the sky. People -- you know, Medicare Part D was introduced because it was broadly believed that seniors were having a hard time paying for their prescription drugs.

Q Now, this opinion about Medicare Part D having the impact you've talked about, is that simply your analysis?

A No, this has been -- you know, first off, like I said, it's a pretty straightforward application of economics, but secondly, there's been empirical analysis in economic literature that have looked at the impact of Medicare Part D, and in fact found that Medicare Part D did have an effect on prescription drug usage, prescription prescribing behavior.

Q If you see the screen in front of you, is this a study that you analyzed and relied upon in reaching your conclusions?

A Yeah. This is the Mark Duggan and Fiona Scott Morton

study, also talked about here as the Lichtenberg study. These are people that I have known personally for a long period of time. Mark Duggan used to be at the University of Chicago actually, and as was Fiona actually. So they've done work on sort of showing that Medicare Part D had the kind of effects we would have expected.

Q And if you look at the part that we've blown up on the screen of this report, even a little bit broader than the highlighted part says, "Our findings," the findings of the two authors, "also suggest consistent with recent research, for example, Lichtenberg and Sun in 2007, that Part D has increased the utilization of pharmaceutical treatments."

How does that relate to your opinion?

A I think it relates very correctly. It says one of the reasons we had a growth in the use of opioids in particular, and prescription drugs more broadly, was the introduction of Medicare Part D, which made prescription medications more affordable for seniors.

Q In the analysis that you've done of Medicare Part D, did you reach any conclusions as to the impact on the kinds of treatments that beneficiaries received as a result of these changes?

A Yeah. I mean, I think you can see, for example, one of the things that they did was increase use of prescription opioids.

Q And I put up your next slide. Maybe you can refer to that as you testify.

A Yeah. Well, this is actually just looking at coverage. This isn't looking at usage. This is just looking at drug coverage. And you can see between 2004 and 2006, as I said, that's when the Medicare Part D came into effect. It had been passed earlier, but it came into effect in that period.

You can see there was a dramatic increase in prescription drug coverage for the Medicaid-eligible population. That would be in this case the 65 to 74.

And we kind of as a control group look at the 55 to 64 who typically would not be Medicare eligible. And you see very little -- you don't see that same sharp increase, so it's pretty clear this was Medicare Part D related.

Q Have you also looked at the share of prescription opioid costs in relation to the time period where Medicare Part D was passed?

A Yeah, that's on the next chart.

Q Let's go to the next chart.

A So here what we have is a bar chart where it divides up the cost into three buckets.

The dark bar is the part that the person pays for, what we call out-of-pocket expenditures. So if I'm the -- if I'm the person getting the prescription, that's the

portion that I pay.

The blue part is the part that's covered by Medicare.

And then the other part is the part paid by other payers. It's not paid by the person. It's paid by his insurance company or whatever.

And you can really see Medicare Part D come in, right? As Medicare Part D comes in, boom, you see a dramatic increase in the blue part, the light blue part, the Medicare part. So Medicare is picking up a lot more of your cost, and out-of-pocket costs, you know, fall very dramatically.

In fact, by the time you get to 2010, if you look, customers are only paying about 20 percent of the overall cost compared to almost 60 percent back in 2001. Okay? So it's a very -- you know, it's a very big difference. That is, the part that they were paying went way down.

That was not by accident. That was an intended outcome of Medicare Part D. They wanted to reduce what seniors had to pay for prescription drugs, including opioids, because they were covered as well. And as an economist, you say, well, geez, if the amount I pay goes way down, I'm going to consume more. And that's what's going to happen. And doctors say, well, geez, I can prescribe this for more people because it doesn't cost them as much as it would have otherwise.

So as an economist, I'm not surprised at all that you

saw a response of usage to a lower out-of-pocket cost.

Q So that we're all clear on this, when you talk about Medicare, that's the healthcare provided by the coverage for seniors aged 65 and above?

A Yes. I mean, Medicare is basically -- think of Medicare as based on age, that you get to a certain point, you become Medicare eligible. Medicaid, which is another government program, also covers expenses for some older individuals but also covers a lot of younger individuals. It's more income-related. It kind of covers a broader set or a different set of individuals than Medicare.

Medicare is really traditionally been coverage for seniors.

Q Does it also provide coverage for those who have disabilities?

A It can. I mean, that's part of it, but it's not -- here we're not looking at that. Here we're only looking at, you know, the Medicare eligible, which in this case was age 65 and over. You wanted to get a group of people we knew were eligible for Medicaid in the data we had -- I'm sorry, Medicare in the data we had. Harder to do for a lot of other groups of people, so we focused on this group because this was a group that was most likely to be Medicare eligible.

Q Are there any other federal regulatory programs you

looked at regarding health coverage?

A Yeah. I mean, Medicaid, for example, Medicaid picks up portions of costs for many people in society, and particularly many poor individuals get some support through Medicaid, so that would be another one. So we looked at Government programs more broadly.

There's another thing that's going on over this period that I don't have on this chart, which is you had -- we had a number of opioids coming off of patent, and so they got cheaper. And, you know, this is measuring the share that you pay of, that as the cost of the drugs go down, that reduces your out-of-pocket expense on top of you having a falling share. So you have a smaller share of a smaller number if something moves from on patent to off patent.

Q What is the Centers for Medicare and Medicaid Services?

A That's often called CMS, one of those alphabet soup names. So CMS is -- they even put CMS.gov on the sheet, so that's how they refer to themselves.

It's an agency that does a lot of things in the healthcare area. They gather data, they -- you know, they issue recommendations, they monitor some aspects of healthcare provision.

What I'm focusing on here in this chart is what we call -- what we refer to as standards of care. And one of

the big other things that happened over the 2000s was an increased emphasis on pain management. That is, hospitals and providers were incentivized to pay more attention to people's pain.

That was monitored as part of the CMS surveys that were being done of providers. Providers respond to what they're being measured on. Like most human beings, if you measure something, they'll respond to that. They know they're being measured on what they're doing.

You know, and when Affordable Care Act came in, it actually incentivized even further some of those responses. So changes in the standard in care was another factor that pushed people toward more prescription activity, prescribing more opioids, because it made doctors more cognizant of trying to make sure they were handling people's pain.

On doctors, like other people in the world, respond to incentives.

Q So we've had some testimony already in this case about standards of care from doctors in the field. What is it about the survey that's significant to you as an economist?

A Well, it provides a direct incentive for people to say, look, I'm being measured. One of the things I'm being graded on is how well I handle pain, and that's going to make you more cognizant of handling pain. If you don't look good on the survey, that's not good for your organization.

So, you know, people respond to those kind of incentives. That's why it's important for me. It's one of those things that affects people's behavior.

Q In fact, the survey had the specific question to the patient, "How often did the hospital or provider do everything in their power to control your pain?"

What's the significance of that?

A I think it's self-evident. If I know my customers are going to get graded, are going to be asked how well I did on a particular margin, I as a provider are going to want to pay more attention to that. I'm going to want to score well on whatever it is I'm being graded on.

And if you tell me pain is a more important part of what I get graded on, and in particular whether I'm getting graded on whether I did everything I could to control pain, well, I'm going to do more. I mean, you don't have to be a Ph.D. economist to understand that if I tell people to do more stuff, they have an incentive to do it.

Q But were there consequences to hospitals or providers if they were receiving negative comments to the survey?

A There were. I mean, early on it was mostly they were just being measured. Later on they actually fed back into the -- what kind of programs the hospital was eligible for. So there was a more direct incentive in the later years.

Q And what evidence have you seen to support your

conclusion that these surveys influenced the patient care at hospitals?

A I think, you know, there are people who have -- this is one where people have actually tried to do studies and, you know, interviews of doctors, and things like that, to -- so there are studies cited in the report about that.

Q Have you observed your work in this case or other matters any evidence that the surveys influenced opioid prescribing?

A I think that's certainly the conclusion that the literature comes to, that one of the responses that doctors had to the need to do a better job or pay more attention to people's pain was more prescribing behavior, including opioids.

Q Tell us what you mean by "literature" in your field.

A There's a variety of literature. Some people try -- you know, a lot of it again is qualitative, where they talk to doctors about; another one is you look at quantities and actually try to measure the increase in quantities. So it would be usually published journal articles would be things that people do.

Q Are these types of questions you're talking about in terms of pain treatments still included in the CMS survey?

A No, they changed how they did that. I don't remember the year, but they've changed this.

And in response to people saying that it had an effect, I mean, again, this is evidence that people felt like these questions had an effect. And in fact people argue that you should take these questions out or you should modify how you question about this, and they did. They did change it.

So I would say that's direct evidence as an economist that people thought these kind of questions had an effect. That's why they altered them.

Q So you also -- you mentioned earlier you had taken a look at social and economic conditions as part of your analysis?

A Yes.

Q What did you find?

A Well, like I said before, one of the drivers of abuse in particular, but also use to some extent, of prescription opioids and other drugs is the economic conditions that people face. One of the responses people have to deteriorated economic conditions is, for lack of a better term, they look for a way to soothe their sorrows. And unfortunately, various forms of substance abuse are often part of that, whether it's alcohol abuse or drug abuse, or other things.

And the other part is it's often in a -- this is where the social aspect really gets important, because it's also

in a broader context because, you know, your career is gone, you lost your job, you're kind of drifting. Often those people have trouble not just with substance abuse, but their families deteriorate. They lose their spouse or they get out on their own, they get isolated. And one thing we know, that those are risk factors for people falling into abuse.

And so that -- you know, that long-term economic decline is a source of bad outcomes for people, particularly men. You know, particularly men. Men have proven themselves to have a greater propensity to deal poorly with those long-term declines.

Q We'll look at some charts that go specifically to this issue, but before we do that, how far back -- you said you looked at trends. How far back in time did you start your analysis?

A Well, I really didn't start my analysis of this issue for this case. When it comes to economic decline and the impact that had on people's lives, that's really what I've worked on since I got out of graduate school.

Once I entered graduate school, really in the early '80s, I published many of the -- a lot of early studies looking at economic decline and the impact it had on labor force participation, family, unemployment, family income, abuse, all those things. That stuff I've studied for the last 40 years. So I've been working on this problem for a

long time.

Q And as you applied that learning to what you've done in this case, is there a time period where you started to look at the changes in these economic factors?

A Yeah, probably 1970 is usually where people start.

Q Why is that?

A What?

Q Why is that? Sorry.

A Well, I mean, that's really when the manufacturing decline as a share of the economy started. You know, manufacturing employment was really pretty flat over those years, but the economy was growing. So it was a share of the economy, and manufacturing was declining. And Bob Topel, who was a colleague of mine and myself, I think we wrote a paper in 1984 talking about the initial impact of the decline in manufacturing and the importance of manufacturing on different parts of the country. And we sort of pointed out how places that had more manufacturing decline were already seeing problems.

By the time we got to the late '80s and early '90s, Gary Katz and I and Finis Welch and I wrote a number of papers looking at the effects of economic decline on wages, employment, family living status, in that period of time. So we've kind of -- that's where I think most people say things started.

Q Geographically, as you focused your review, were there particular parts of the country that had the impact of the manufacturing decline you talked about?

A Yeah. It differs at different times because, you know, different industries are located at different parts of the country. So, for example, aerospace is in some places and autos are in others, and steel. They're in different parts of the country. So, you know, what we really exploited was the fact that different regions were affected at different times. That's really what we focused on.

You know, so, for example, declines in steel and autos, and things like that, are going to be biggest in the Midwest. That's where you're going to have the biggest -- upper Midwest is going to be hit.

Decline in aerospace, which actually happened earlier and to some extent later, would more affect the northeast, California, Texas, where there's a lot of aerospace activity. You have the dot-com bubble that also had a problem.

So we've studied a lot of different declines, but probably the areas that have been the most hit have been the upper Midwest.

Q That include Ohio?

A Ohio, Pennsylvania, West Virginia, to some extent parts of Michigan, Wisconsin. But the upper Midwest area

has been hit pretty hard.

Q And in this particular case did you look at the counties that are the plaintiffs here, Trumbull and Lake County?

A Yeah, I did. So we'll show you some slides. And we can go through them pretty quickly because I think it's a pretty simple story.

Q As we start to look at the slides, what is the overall impact that you observed that you would like to communicate to the jury?

A Well, there's really two parts to decline; one is sort of the short-term impact of decline. So if my area suffers a sharp decline because auto sales, say, fall quickly in a given year, then you see that shows up as unemployment, you see it show up as some reduced labor force participation. And not just for those people in that industry, because when the auto workers get out of work, that's less demand for people who run bars and restaurants and clothing stores and furniture stores, and you see a feedback into the broader economy in those local areas, okay?

But that tends not to be so associated with, like, social problems, you know? The social problems tend to arise when that decline persists, right, that it lasts a long time; that, you know, people really not only have a bad outcome, but they have a persistently bad outcome, and

eventually it wears on people. Family structure problems show up, substance abuse problems show up.

So I would distinguish between the short-term impacts of a decline and the longer-term impacts of decline.

And, you know, and we've seen it in various parts of the country, and the Midwest is one of those places.

Q Let's take a look at some of these graphs that you've put together. And you said you could do it quickly. I think we're all happy to move, but I want you to be -- to explain what you're doing, what you observe, and the significance.

So let's look first at slide 14.

What are we looking at in this particular graph?

A This is some of that longer-term change in some of the most severe adverse outcomes that people have.

And this is from two economists, Case and Deaton.

Angus Deaton won the Nobel Prize in economics for his work, including work like this.

And what they're looking at is what they call Deaths of Despair.

Q Tell us what that is first.

A Their terms for Deaths of Despair are deaths that they see as barometers of people really being kind of in despair in terms of their overall lifestyle. They look at deaths from alcohol abuse, both short-term deaths from alcohol

abuse as well as long-term deaths from, like, cirrhosis, death from suicide, which is maybe the ultimate measure of despair, and then deaths from drug overdoses. And they say, you know, those are indications of people who have suffering from some aspect of despair, or at least they're barometers of that despair.

And what they show is that, you know, if you look at this age group, and this is 55 to 54-year-olds --

Q You said 55?

A I'm sorry, 50 to 54-year-olds, and they break it out by education level, for people with a bachelor's degree or more or people with a high school degree or less, and they also break it out between men and women.

And what you see is that there had been an increase for all the groups, but a much greater increase for the low-educated groups. And we know that the economy changes over that long-term much more severe for those without a high school degree or with a high school degree compared to those with a college degree.

Changes in the economy, and this is something I wrote numerous papers on, have really favored the more-educated groups over the less-educated groups over this period.

And that long-term decline has had -- has had a toll on particularly the less-educated groups. As I said before, particularly on men.

The biggest toll has been on men. That's true among college graduates, but certainly high school graduates as well.

Q Let's turn to your next graph that you present. What are we looking at here?

A This is Labor force participation.

Q So what is that and why are we looking at it?

A Well, labor force participation is a measure of how many people are what we call in economics in the labor force, and that includes actually people who are unemployed. That is, labor force participation is basically people who are employed plus people who are looking for work, right? They're either unemployed looking for work or they're employed, you're counted as participating. That means you're either working or looking for work.

And what we're looking at here is how that has changed. So for both college graduates and high school graduates, we're doing index that number to 100. So 100 is like -- think of that as your baseline.

And what we see is that for college graduates, we've gone from 100 to about 97. So it says of that 100, think about it, there were a hundred people who previously would have been in the labor force, 97 of them are still there, so only 3 of those have dropped out among the college graduates.

Q I'm sorry. That's over 50 years?

A Oh, that's over -- yeah, 50 years, from 1970 to 2020. I forget that's 50 years, going back to 1970. Tells you how old I am.

Then if you look for high school or less, instead of 3 people dropping out, we go from 100 down to about 87, so that would be 13 people. So much bigger decline in participation among the high school graduates.

Q What's the significance of this as you're trying to address the impact of the changing economic conditions?

A Well, it means you would expect to see the biggest impact among that group. That's the group where you would expect to see the impact among, because those are the people who have been hurt the worst. Areas of the country that have a lot of people in those education groups, and people -- you know, places where a lot of those people used to have good opportunities and those opportunities have gone down again would be the places where you would see the biggest effect.

Q Let's look at your next slide.

A Yeah, this is the decline in manufacturing employment over time.

Here you can see that the decline in manufacturing employment measured as millions of jobs was pretty modest actually from 1970 to 2000.

That kind of hides what's really going on because the labor force was growing very rapidly over that period. That was the baby boomers coming into the labor market. So manufacturing share of the economy was shrinking over that entire period because you had the same number of manufacturing jobs, but the rest of the economy was growing. So manufacturing share was actually falling, and that was creating problems already back in that early period.

But then post 2000 you saw a really sharp decline in manufacturing employment in both of the recessions, the 2000-2001 recession, sharp decline, and then the 2006-2008 recession, another sharp decline. And manufacturing employment has kind of recovered a little bit from there, but remains way below where it was in 2000.

Q Let's go to your next slide. Here you talk about your slide relates to this is Ohio-specific, manufacturing employment. And going back a little bit, we were talking about education.

You're combining the two concepts here. Why?

A Well, because I think here we're looking at the story as it's unfolding in Ohio over time. Because while manufacturing is shrinking, it's also changing. It's changing in a way that favored college graduates very much relative to high school graduates.

You'll see that here, because if you look at thousands

of jobs for high school graduates, we're at, like, you know, 1.25 million back in 1970, and by the time we get to the end, we're, like, 300 -- a little over 300,000. So we've lost, like, three-quarters of those jobs for the high school graduates, whereas for college graduates we actually have more people working in manufacturing today than we did in 1970.

So again, for that less-educated group, this is going to be particularly telling in Ohio.

Q And when you say particularly telling, what does that mean? What's the impact?

A We're going to expect their lives are going to be different, things are going to change. I mean, if you -- manufacturing employment was a major source of good jobs, you know, high wages, steady employment for a lot of these less-educated individuals. The same opportunities aren't there today, and that's true whether you're looking at the person who was young then and old now, or the person who's young today compared to the guy who was young back then. Opportunities are less.

Q Let's take a look at your next slide, please.

How does this relate to what you were just talking about?

A Well, here you can see that, you know, the U.S. as a whole has seen manufacturing share, you know, this is what

the change over time in manufacturing share of employment.

Minus 10 means manufacturing share fell by 10 percentage points, so maybe it went from 22 percent to 12 percent or 28 percent to 18 percent. It was a 10 percentage point decline in manufacturing share of overall employment.

And you can see Ohio is not the worst in terms of change in overall share, but it's toward the bottom. And the other midwestern states would typically be down there as well. Very few states have seen growth in manufacturing share. North Dakota, South Dakota really would be the only two major ones.

Q So just so we're clear on your chart, each bar represents an individual state?

A Yes, each bar. So you can see the state names are down on the bottom. So the red one's Ohio, and you can see OH down at the bottom. There's Illinois, where I live, right next to it. So just like Ohio saw decline in manufacturing share, so did Illinois.

What people often forget is, you know, the northeast, many of the northeast states also lost. Massachusetts, Rhode Island, Pennsylvania. You've got to be careful, because we're looking at share here, and, you know, think about it. If you have a decline in manufacturing share employment but an increase in, say, other types of employment, say finance, financial sector, that's going

to -- both of those are going to work to reduce manufacturing share, but that economy's going to do better because while they lost manufacturing jobs, they gained a lot of finance jobs.

In Ohio what we're going to find is that they lost a lot of manufacturing jobs. Not nearly many other jobs came in to replace those.

Q Let's move to your next slide.

A So this is looking at Ohio. Again, we're focused in on Ohio. This is share of employment. And you can see manufacturing share -- remember I talked to you before, if you looked at manufacturing employment in the U.S. between 1970 and 2000, that employment manufacturing for the U.S. as a whole was basically flat, and I said that hid like a big decline in manufacturing share? Well, you can see that here for Ohio.

That is in 1970 almost 36 percent of the jobs were in manufacturing in Ohio.

Q I'm sorry to interrupt.

Is that across all education levels and genders?

A I believe so. I think this would be the case. This would be the overall.

Q So in 1970, if you look at all of the jobs in Ohio, the manufacturing share was what?

A 37. -- 35.7. Sorry.

Q Okay.

A By the time you get to 2000, that's fallen to 20.4. And then by the time you get to 2019 it's down to 15.7. So we've got less than half the share of jobs being in manufacturing that used to be there.

And remember, back in the early days, almost all those were for high school and below, and now most of them are, you know, increasing number for college graduates. So if I were to do this just for high school graduates, it would be worse.

The other thing to notice is while that share has been declining, those are the highest paying part of the economy, right? Those are where those workers were earning the most, was in manufacturing. So we've had a decline in what was probably the highest paying part of the economy in Ohio.

Q So if we look at the middle of the chart, you have a column Manufacturing that's under median real annual wages.

Break that down. What are you telling us here?

A Well, I'm saying what you really want to see here is just the comparison across the columns. If you go all the way to the right-hand column, the median was back in the early days was about 40,000. It's actually come down somewhat. It's about 35,000 by the time you get to the end in 2019.

But what's most important is, in every year the

manufacturing wages are much higher than the other wages. So not only are we losing manufacturing jobs in Ohio over this time, those jobs are disproportionately the highest paying sectors, particularly among the high school graduates.

That is, if you look, and again, Finis Welch and I did it, we didn't do it for Ohio, we did the United States as a whole, but what we show is the differences across these industries were biggest for the less-educated workers, smaller for the college graduates, who did quite well, for example, in finance and insurance and real estate, as well as in manufacturing.

Q So as you put some of these things together, what is this telling you about the overall conditions in Ohio compared to the rest of the United States?

A Well, we can look at a chart on overall GDP growth. That's probably a good thing to look at.

Here I've ranked the states in the United States in terms of their annual rate of GDP growth. That's what's in the last column.

Q First, what's GDP growth, and why do we care?

A GDP is gross domestic product. It's a measure of the overall economic output in an economy. You can do it for a country, you can do it for a state. It's a measure of the overall, you know, production that you have going on. It's

the overall market activity.

I've ranked the states from the lowest to the highest. I'm showing you here the 10 lowest growth states in the country, and you can see Ohio was number 3 from the lowest, so the third slowest growth over this period was Ohio.

The other states nearby, the states that grew even more slowly than Ohio, were Michigan and West Virginia. The ones right behind on the other side were Illinois and Pennsylvania.

So you can see that there was relatively slow growth in the economy in these areas.

Q You've also taken a look specifically at Lake and Trumbull County statistics, haven't you?

A I have.

Q Let's go to the next slide.

What are we looking at here?

A Yeah, so this is labor force participation in these two counties. Remember we looked at labor force participation earlier. It's --

Q That's the people who have jobs and those that are looking for jobs?

A Yeah, to add together the fraction of people with jobs with the fraction of people looking for work, that's labor force participation.

And what you can see is the index to 100, we're going

to say how far down have you come from where you started.

For Lake County, we've gone from an index of a hundred to roughly 80. So of the hundred, we're down 20.

And in Trumbull County, we've gone from a hundred down to, like, 72 or 73, so we've lost about 27 or so; basically more than a quarter of the labor force participation rate we had back in 1970.

And you also see kind of the long-term nature here. This has been going down. It's not just happened in the recent recession. This is that long-term decline we've talked about before.

Q The ages that you're looking at here are 16 and over?

A These are males 16 and over.

Q Why are you only looking at males?

A Because that's the group that suffered the most and also the one for which I think labor force participation is the best measure of overall economic activity.

And certainly when you look at social outcomes, nonparticipation for men is often associated with poor outcomes, health, family, everything. You know, nonparticipation is not associated with good outcomes for men.

Q And you talked earlier about social and economic conditions in the United States and Ohio. What are your observations related to Lake and Trumbull Counties?

A They're kind of on the -- you know, they're part of the story. They're one of the places where we've seen particularly strong versions of the broader economic story we see for the country.

Q Let's take a look at our next slide.

What are you demonstrating here?

A This is just looking at, and I believe this is 2007 to 2010, this is just looking at opioid fatalities. We already saw in the previous graph that both Lake and Trumbull Counties have been places where labor force participation decline, manufacturing employment decline, they've been part of that broad story. And not surprisingly, those are places where opioid mortality also went up.

Q And when you talk about opioid mortality, what is that measuring?

A It's measuring how many people, you know, cause of death in some way was associated with opioid overdose.

Q Any type of opioid?

A Any type of opioid. You can also look at it separately for prescription opioids versus illegal opioids, but -- so we'll do all of that. We'll look at, you know, both prescription opioids in isolation, as well as illegal opioids including prescription opioids.

MR. MAJORAS: Your Honor, if it works for you, this might be an appropriate place for a break.

THE COURT: All right. I was looking for a convenient stop.

Okay, ladies and gentlemen, we'll take our mid morning break. 15 minutes. Usual admonitions. And then we'll pick up with the balance of the doctor's testimony.

(Recess taken at 10:28 a.m.)

(Jury present in open court at 10:47 a.m.)

THE COURT: Okay. Please be seated.

Doctor, you're still under oath from this morning.

Mr. Majoras, you may continue.

MR. MAJORAS: Thank you, Your Honor.

Good morning everyone.

Good morning again, Dr. Murphy.

BY MR. MAJORAS:

Q Before we move on to your next topic, I wanted to ask you some questions about some things we've seen.

We've seen some slides specifically to men in the labor force. Why are you looking at the men in those slides?

A Well, I think what's going on with men is important for two reasons. One, they seem to be the ones for whom being out of the labor force is the strongest predictor of poor outcomes in terms of health or abuse or family structure, and things like that.

You know, women in and out of the labor force depends

on a much wider variety of factors. You know, they may be home taking care of children, which doesn't really from a social standpoint lead to any particular problems. Often it's a very good outcome for women. And prime age men not in the labor force are usually a pretty good indication that there's an issue; not always, but much more so than women. So I think that's one of the reasons that we measure.

There's a more complicated story for women, but also when we talk about these kind of adverse outcomes, they seem to be much more prevalent for men in that age group.

Q So to the extent that you look at certain statistics regarding men, is that in any way a reflection on your view of the value of women in the workforce?

A No. Women -- I mean, you know, I talk a lot, I just gave a talk a couple weeks ago to a big group of people about, you know, changes in the economy. In many ways women have fared much better than men over the last 30, 40 years. You can see it in college graduation rates, where women now account for the majority of college graduates, a significant majority of college graduates.

Women traditionally have been better in school than men. I mean, I think people often forget that. High school graduation rates for women have been higher than for men for a long time. Women do much better dealing with adversity than men do.

One of the coolest things -- one of the things you can look at is, like, what happens when your spouse passes away. Women tend to do pretty well after their spouse passes away, men much less so. Men tend to have much harder time after their spouse passes.

So when people talk about women being the stronger group, you know, in a lot of economic ways they turn out they are. They do well in the labor force, do well outside the labor force; have increasingly done well in education, always done well in education.

Men have, particularly less-educated men, have fallen on pretty hard times.

Q I'll be sure to include all that when I recap today's events to my wife.

Let's turn back now to a topic you were starting on as we took our break this morning, which was analyzing trends in opioid mortality.

MR. MAJORAS: And let's go to slide 25, please.

Q Take us again through what you want to demonstrate to the jury in this slide.

A Okay. This is a picture of, you know, what people sometimes call the opioid mortality crisis or the growth in opioid mortality over time.

Here we're looking at opioid mortality of all types.

Could be heroin, could be fentanyl, could be prescription opioids. It's any source of opioid mortality that happened over time.

And I drew a vertical line at 2010, and you'll see later why I drew the line there. You can kind of see that, you know, it had been increasing before 2010; increased, if anything, faster after 2010 in terms of overall mortality.

Q This particular slide relates to Ohio?

A Yeah, this is Ohio. A picture, if you just looked at the line, would look not that different from the U.S. as a whole. The magnitudes would be somewhat different for the U.S. as a whole.

Ohio would tend to look more like the states east of the Mississippi. I'll talk more about that later in terms of the time pattern. But you would see a dramatic rise in the country as a whole. And when you hear the headlines, often it's about the country as a whole, not about a particular state like Ohio.

Q Let's turn to your next slide.

What have you done here in relation to what we just saw about Ohio?

A Well, we just took those same data, right? The overall mortality was the line we had in the previous graph. The top of the green curve is the same as that here.

Q So if I were just to take the -- trace the top of the

light green part, that would give me the same black line we saw in the last slide?

A Yeah. And opioid mortality rate, now, we're dividing up into three groups. The blue are prescription opioid mortality. That's mortality associated with people who upon death it was determined that they had taken prescription opioids. They, like, had a drug overdose death and it was prescription opioids.

The dark green is people for whom there were both prescription opioids and illegal opioids in that determination, so that would be what we call the both category. It's like an overlap group whereas people have both prescription and nonprescription opioids.

And the light green area would be people for whom there's only illicit opioids, and that could include, and probably the big ones there are, heroin and fentanyl.

Q Let me break down the prescription opioids part, the blue part.

When you say prescription opioids, are those only people who are taking it as prescribed by their doctors?

A That was the next thing I was going to say. Yes, that was a good question.

No, these are the drug that was in the person's system. It could be someone who was prescribed the drug, but it's quite likely, in many cases it's actually going to

be someone who is abusing prescription opioids. So they might -- they in a lot of cases wouldn't be the person who got the prescription. They're somebody who obtained prescription opioids but consumed them call it illicitly, or whatever you want to call it, sort of abused prescription opioids. They weren't consuming them by a prescription.

They would be included in that blue, that blue area.

Q So in placing this chart in front of the jury, what's your observation that you want to share?

A Well, you can kind of see that there's sort of two periods, particularly when you look at prescription opioids, that they kind of grew in the earlier period up to, you know, 2010, 2011, but then the deaths from prescription opioids kind of tail off pretty significantly post 2010, particularly if you look at the ones that only had prescription opioids.

Whereas the overall death rate is really going up very quickly in that later period. As we'll see in a minute, that's mostly heroin, and then particularly fentanyl toward the end.

Q And did you take a look at this type of information as it relates to Trumbull and Lake Counties?

A Yeah, I think the next slide is the picture for Trumbull and Lake County.

If you kind of flip back and forth between the two,

you can see that the magnitudes are a little different. So for Ohio as a whole, we reach a peak somewhere between 45 and 50. And Lake and Trumbull County we get a somewhat higher peak between 55 and 60.

So a little more severe problem in Lake and Trumbull Counties than it is in Ohio as a whole, but the time pattern kind of tells the same basic story, that the things that are driving things in Ohio as a whole are driving things in Lake and Trumbull County.

MR. MAJORAS: And let's go to the next slide, please.

Q What have you done here?

A Here I've just kind of taken the same kind of data, and what I've done is just instead of stacking them together like I did in a previous chart, I've just separated the two out.

So the green line is "prescription opioids." And what I'm measuring there is the same as the blue area on the previous graph. It's people who were only prescription opioids.

The "both" category is in heroin and fentanyl. But again, when I say prescription opioids, that doesn't mean people with a prescription. That means somebody who's taking a prescription opioid, in many cases abusing a prescription opioid, that was not prescribed for them.

That's all included in the green line.

And heroin and fentanyl are the red line.

And what you see is really two very different periods. In the early period we have heroin and fentanyl deaths along with prescription opioid deaths going up together. Starting around 2011, there's a movement away from prescription opioid deaths, but an increase in heroin and fentanyl deaths.

Q And what is the significance of that in your analysis?

A Well, I mean, one simple story is it's clearly not prescription opioids that have led to the explosion in deaths in this later period. It's not people overdosing on prescription opioids. It's people overdosing on illegal drugs, and, as we'll see in a moment, particularly fentanyl. Fentanyl is a big part of the growth in mortality story in this later period.

Q Let's go to your next slide, where I think you break out fentanyl and heroin.

A Yes. So I've done the same thing here with heroin and fentanyl that I did with prescription opioids in the previous one. If you only have heroin, you're in the light-colored line. If you died -- if you had mortality associated with just fentanyl, you're in the red line. And if you had heroin and fentanyl, you're also in the red line.

So think of the light-colored line as just heroin

alone. The red line, some combination of heroin and fentanyl. I do that because fentanyl is clearly the more lethal drug here. And indeed, most of this growth is from people just with fentanyl, no her -- no prescription opioid -- no, I'm sorry, no heroin, just fentanyl. That's the big growth in that red line.

Can't see that on this graph, but I've done that in my analysis in my report.

Q You have a couple of dotted lines running down the middle. Why do you put those in there?

A I tried to kind of give you somewhat of a brief description of what's going on in the national data. So the dash line, the first dash line is really when we saw a sharp rise in national heroin overdose deaths. And you'll see that's -- you know, that's when we see kind of a sharp rise in national heroin overdose death -- I'm sorry -- heroin overdose deaths in Ohio.

For the orange line -- I'm sorry, the dark-colored line, we see the national trend on fentanyl starts in 2013, and that's when it starts in Ohio. So kind of heroin and fentanyl in Ohio are sort of following the broader national trends on heroin and fentanyl, although we'll see in a minute -- not in a minute, a little bit we'll see that fentanyl is going to differ quite a bit between west of the Mississippi and east for reasons we know.

Q We'll save that for a future slide then.

A Yes.

Q You also take a look at opioid shipments in relation to the mortality. So what we've been looking at in the last few slides are mortality rates, right?

A So far in these charts we've only looked at mortality. We haven't looked at anything about shipments of prescription opioids at all.

Q So let's take a look at your next slide.

A So here we're looking at the early period up to -- the blue line is opioid shipments. That's shipments into Ohio or to Ohio of prescription opioids.

Q So those are all prescription opioids that don't include fentanyl or heroin?

A They don't include fentanyl or heroin. They are just prescription opioids to Ohio.

Q Of all shipments or just these defendants?

A All shipments into Ohio.

Q Okay.

A And the blue line sort of shows how shipments of prescription opioids changed over time. That is, we saw a rise in prescription opioid shipments from the late 1990s up to about 2010 or '11, and then we saw a subsequent decline in prescription opioid shipments. You can see prescription opioid shipments in here peak at MME per capita of about a

thousand and come down to less than 500. So there's more than a 50 percent decline in prescription opioid shipments on a per capita basis to Ohio since 2010-11.

People know what MME is, it must have been talked about. I'm not going to go into MME.

Q Milligram -- morphine milligram equivalent.

A Yes.

Q Unless I flipped my Ms.

Your next slide also deals with a similar topic, right?

A Yeah. It's really pointing out that prescription opioid shipments and overdose deaths are moving in opposite directions in this later period. You see shipments on the way down and opioid deaths, and particularly we already know deaths from heroin, and particularly fentanyl, are really going way up in this later period.

Q So let's just make sure everyone is looking in the same place.

You have a line drawn it looks like right about 2010. What is that line?

A Yeah, 2010, again, that's roughly when shipments peaked. Maybe it's 2011. But, you know, right around then.

We see after that, shipments declining -- that's the blue line going down -- again, from about a thousand to less than 500.

At the same time, opioid mortality is going from, you know, a little over 15 and peaking a little bit short of 50 and, you know, kind of around 40 by the time we're at the end of the data here.

So again, this later period is a period where there was a big divergence, where shipments are going down but in fact opioid-related mortality is going up.

Q As an economist analyzing supply issues, what is the significance of that difference we see or that directional difference in the later part?

A Well, I mean, what's going on here, it's certainly not a story, we're having more people consuming prescription opioids over this period and that consumption in prescription opioids, whether licit or illicit, is what's going on on the death side.

On the mortality side, it's clearly nonprescription illicit opioids or illegal opioids that are generating the deaths, and prescription quantity is going down over this period of time, not up.

Q You've also as part of your analysis taken a look at who is receiving prescription opioids that have been -- who have been prescribed prescription opioids; is that right?

A Yeah, because one story one could think would explain this is you have a bunch of people who are taking prescription opioids who then become the consumers of -- you

know, they were prescribed prescription opioids, then they become the consumers of heroin and fentanyl in the later period.

So one way to look at that is to kind of match up who is dying of heroin and fentanyl in the later period and who was it that was getting the prescription opioids -- the prescriptions for prescription opioids in the earlier period. So that's what I'm going to do now.

Q I'm sorry. Let's take a look at the next slide.

What are we seeing?

A So these are the age breakdown into four groups. Think of it as younger men, 15 to 50; older men, 51 plus; younger women, 15 to 50; and older women, 51 plus. And we're looking at seeing who was getting the opioid prescriptions during this period of time, and the biggest group is actually older women. They're accounting for a third of overall prescriptions. The lowest group is actually young men, who are accounting for less than 20 percent of opioid prescriptions during this period of time.

So predominantly being prescribed to older women, second most to older men, followed by younger women, and the lowest would be younger men.

Q What's the time frame that you were analyzing here?

A This is that '21 [sic] to 2010 period. This is that pre-2010 period, the period where we saw rising shipments,

remember, and who was getting those shipments or who was being the prescriptions associated with those shipments, it was disproportionately older women, smallest groups being actually younger men.

Q So you said you were going to compare the folks who were getting prescriptions, actual prescriptions, to the folks who are experiencing the mortality rates. Let's go to slide 33.

A Right, this is -- remember though, this is prescriptions in the earlier period we were looking at, right? It was who was getting prescriptions in that earlier period where we saw the growth in prescriptions, and then who is it that's dying of opioid mortality, predominantly the heroin and fentanyl in the later period.

So this is the mortality picture in the later period. So the years here are 2010 to 2019. That's where we saw that big rise in mortality.

So here you can see that 60 percent of the people dying are young men, and the smallest is actually older women, which is only about 5 percent. So it's completely flipped from what we saw in the prescription data. The people dying of heroin and fentanyl mortality in this later period are a very different group than the people who are prescribed in the earlier period.

On top of that, remember, this is 10 years later, and

a fair amount of that mortality among these young men is going to be men like, you know, 15 to 25. And most people were, like, 5 to 10 in that earlier period, right? They're like really young in that earlier period. They would not have been people taking prescription opioids, either licitly or illicitly, during that period of time. They were very young.

Q So when you put the last two slides together, what is it that you draw from this information.

A I guess it tells you the people receiving the prescriptions, which, you know, are predominantly older women and older men to some extent, in the early period is a very different group than the people who were dying of heroin mortality in the later period, which is young men 15 to 50, who account for, like, 61 percent of the mortality when only 19 1/2 percent of the earlier period prescriptions. Again, that's even different groups.

If you look at the women, they were, like, 33 percent of prescriptions but less than 5 percent of mortality. So it's very much a mismatch. It's not the same people that were getting prescriptions who were later dying of heroin and fentanyl.

Q In relation to the analysis you've done and the conclusions you've reached with respect to what Dr. Keyes --

(Court reporter interjection.)

MR. MARGOLIS: I apologize, I'll slow down. Maybe I'll do even a better question.

Q In relation to your criticism of Dr. Keyes and her analysis, what is the significance of what you just told us?

A Well, I think part of Dr. Keyes' analysis -- again, I have not read or was not here for her testimony. I know based on her report she talks about, you know, this concept of a gateway, where people have a gateway from prescription opioids to ultimately other opioids, and illicit opioids like heroin and fentanyl.

The simplest version of that gateway story is that somebody starts taking a prescription opioid; they no longer have access to the prescription opioid, so they move -- that same person moves, who was prescribed the prescription opioid, moves to illicit opioids.

Based on this, that doesn't seem to really fit the bulk of the growth because the bulk of the growth is among a group who is getting very low levels of prescriptions, and the group that was getting the most prescriptions doesn't show up as the high mortality group in the later period.

But there's other -- you know, she has a broader gateway hypothesis that it's not the people getting the prescriptions, it's people who are abusing prescription opioids then switch to be -- we'll want to look at that one too.

Q So let's talk specifically about your analysis, putting all this together, not just the last slides.

What is your analysis of the causal link that Dr. Keyes testified about and whether that is a sufficient way of doing it?

A Yeah, I think as I interpret and as I have seen her discussion of the causal link, she's saying, if you take prescription opioids, in many cases it's illicitly, you're at increased risk for then doing other nonprescription opioids, you know, abusing nonprescription or illegal opioids. And she does that by looking -- you know, she cites a bunch of studies, for example, where they look at heroin users and ask what they had used previously, and many report to having abused prescription opioids before they used heroin.

However, what she's ignoring, and she concludes based on that, "Well, I've established this link between the two; therefore, more prescription opioids therefore must have been what drove the illicit opioids."

And as I talked about before, you can't do that once you think about the broader picture, because if you restrict prescription opioids, fewer people might follow that pathway of abuse prescription opioids and then abuse nonprescription illegal opioids, but more people are going to go the other way and go directly to illicit opioids.

And you don't need many of those people to go directly to illicit opioids to have that be a very important effect, because we know relatively small part, fraction of the people who consume prescription opioids, move on to illegal opioids. So even if a small fraction of those people kind of go direct instead, which is what we've seen happen in the more recent period, more people go directly to these other drugs, that is something you have to take into account if you want to calculate what the actual effect was.

And she didn't do that. She just looked at that one link, and that one link is only a part of the story. It's like that kid watching TV and I say, well, TV is bad. Well, I don't know. You've got to take account of that effect, but you've got to take account of the rest of the story too. And if you don't take account of the broader context, that you have people who are out there abusing drugs, they're abusing prescription opioids, maybe they're abusing nonprescription opioids, those people are going to shift to another form.

And we've seen that. You know, more and more, for example, of the deaths we have seen with fentanyl are not people with fentanyl and prescription opioids. They're people with fentanyl and cocaine or people with fentanyl and other types of illicit drugs. And that indicates that you've got to think about these other pathways before you

talk about, like, what caused what and how they're linked together.

You can't just say, well, it's all this linked to this. You've got to look at that bigger picture. She didn't do that.

Q When Dr. Keyes testified, and I believe she wrote about in her opinion as well, she talked about association and causation.

How does that apply to your analysis?

A Well, there's two issues. One is many of the studies she relies on are really just associations. They look at people who abuse cocaine -- I mean, I'm sorry -- abuse heroin and ask, what else have you done.

Well, that doesn't tell me that was a causal factor because if I have somebody who, you know, has a propensity to abuse substances, they're going to abuse this substance and other substances. It's not -- that's a correlation, not a causation.

The other side of it is, is that even when she talks about causation, that if people do this, then they're likely to do this, again, that's -- even if that's true, even if you could establish that's causal on that narrow perspective, even if I could establish dosing people with TV causes a problem, it doesn't mean that taking away TV has solved the problem because you have to ask why they're doing

what they're doing, what would they do instead.

And so that causal link she looks at is only a small part of the overall picture one would need to look at to reach appropriate conclusions. Let alone, and we haven't talked about this yet, for the purposes of what we're here today, you have to link it back not just to consuming prescription opioids, it has to be linked back to behavior by the pharmacies. You have to think about how would the pharmacies be part of this equation as opposed to other factors that would be driving this equation.

Q So as you put all that together, what is -- can you summarize what your conclusion is with respect to Dr. Keyes' analysis on causation?

A You know, what I'm saying is I'm not arguing with her on an epidemiological point. I'm just saying if you want to understand the impact of reduced availability of prescription opioids, her analysis is insufficient to do that.

You know, as I say here, Dr. Keyes does not appropriately analyze the causal impact of reducing the availability of prescription opioids, because it would change more than just the number of people who use prescription opioids. It would change many other things, including people's propensity to abuse other drugs, including going directly to heroin and fentanyl.

Q So let's now switch directions just slightly, I think, because you were talking about other factors that you analyzed.

And what have you -- what did you do next in terms of your analysis about increased shipments of prescription opioids?

A Well, one of the things we pointed to was, you know, boy, we saw this huge growth in mortality associated with heroin and fentanyl in the later years. You know, to what extent is that -- can we think about that as being tied closely to the growth in prescriptions, that there were more opioids being prescribed in the earlier period?

So I have a couple of analyses that address that.

Q Let's flip to your next slide then.

What are we seeing here?

A All right. This is what we call in economics a scatter plot. And I don't know if you've ever seen one of these before. The horizontal axis, the one that runs left to right, is average prescription opioid shipments before 2010. So states -- and each dot in here is a state. So Ohio I've highlighted in green, right? That's Ohio.

So if you had more prescription opioids shipments in the earlier period, you're further to the right. The further you are to the right reflects more prescription opioid shipments in the early period.

On the vertical axis we're measuring opioid mortality, okay? So what we're looking at is the places that have more shipments have more mortality.

Q Let's turn to your next slide.

A So that's the --

Q We sort of minimized the dots and we're just talking about what the slide is showing.

A Yeah. The question is do places that have more shipments are the same places that have mortality. Does it seem like shipments are the big driver of mortality, that high shipments means high mortality, low shipments means low mortality, or is there a bunch of other factors that seem to be important for the overall level of mortality.

Q So when you looked at this scatter chart, what were your observations?

A Well, first off, the association's pretty weak, that is shipments explain a very small part of overall mortality differences.

And if you think about it and what does it say about causation, that's an even stronger statement, right, because shipments and mortality are going to be related even if there's no causal link running from one to the other.

Q What do you mean by that?

A Well, if you have a place that has a high demand for opioids, you would expect higher shipments and higher

mortality, right, because, you know, there's some associations; like they have more cars, you can have more car accidents.

That part of it's going to be there independent of any causal link of, say, supply behavior to -- this is just looking for an association, and I guess the conclusion from this is the association's pretty weak, in that early shipments play a very small amount of the overall variation in mortality.

Q How do you demonstrate that or how do you explain that with your next slide?

A Well, I've just got to give you an example.

So, example, just compare Ohio, which is the green dot, with Nevada. Nevada had much more shipments per capita, 815 versus 600, on average over that earlier period, but when we look at the mortality difference, you can see that Ohio had much higher mortality than Nevada. Nevada had much more shipments, but their mortality is about 10 per hundred thousand, where we're in the high 30s per hundred thousand for Ohio.

So, and Nevada's not the only one. A lot of the -- most of the states actually with higher shipments than Ohio had lower mortality. That tells you something else is going on here that's driving mortality, so saying there's other factors like I talked about before, a lot of other things

going on. And indeed, shipment -- you know, even the level of shipments, which, again, reflects both supply and demand factors, even together those supply and demand factors driving through shipments have a very small effect on relationship to overall mortality.

That says other things are driving mortality beyond just the level of shipments in the earlier period.

Q You mentioned earlier you were going to talk to us about eastern states and western states, and I think we've gotten to that point.

MR. MAJORAS: If we can go to our next slide, please.

Q Why are you doing -- why are you making that distinction here, and what do you take from that?

A Well, what I'm doing here is showing you the shipment curves. And, you know, the highlighting here isn't as good as we should have done. We kind of messed up the highlighting, but I'll try to explain it.

You have opioid shipments in the east were -- I'm sorry, west of the Mississippi. That's the blue curve. And you see west of the Mississippi, like we thought, shipments rose until about 2010, and then declined pretty dramatically after 2010.

If we look east of the Mississippi, we see opioid shipments rose pre-2010 and then declined pretty

dramatically after 2010. There's a little more rise in the east, but the decline is actually pretty similar east and west.

So the shipment story is not so different east and west, but if you look at the mortality stories, they're incredibly different. That is -- oh, go back to my slide. We're too far.

Q It happens by magic.

A If you go back and highlight the left-hand panel, you see that overall opioid mortality in the west went up in the earlier period but didn't go up much at all in that later period. It went up some, okay?

If you look at the east, on the other hand, there's a dramatic rise in opioid mortality in the later period. And that's because fentanyl came in much more heavily into the east than the west, driven by what was a big difference in the supply conditions in the illicit market in the east and west. That is, the eastern United States was dominated by powdered heroin, for which fentanyl was much more easily introduced into the supply chain. In the west, the primary heroin supply was black tar heroin that was supplied in the west, for which fentanyl was not nearly as easily introduced in the supply.

So that illicit market difference generates an enormous difference between east and west.

Q Okay. We've seen this flipped back and forth, and I apologize for that, on the slides.

Tie all these together. What is it as you're looking at a connection between supply and mortality rates that this is showing you?

A I'm saying if you look east and west, what you see is in the west and east very similar stories on -- not even supply, right? This is just output, just very similar stories in terms of the growth of prescription opioid shipments in the earlier period, and then the decline in prescription opioids; but you see very big differences across these two locations in terms of mortality with really, you know, rising, but not nearly rising as quickly mortality in the west, and heroin and fentanyl mortality in the east.

Again, that linkage between the shipment story and the mortality story is pretty weak comparing east and west.

Q Taking into account all of the analysis that you've performed in this case, do you have an opinion on the nature of drug abuse in the United States over time?

A Well, I think there's another thing we want to look at, which is -- and this is an interesting study. This is a study by Jalal.

Q This is something you cite in your report?

A Yes, it is. And Jalal makes a pretty interesting

observation. He says, look, we have this growth in opioid mortality and opioid abuse in the post 2000 period, and he points out that that's not the first drug abuse mortality increase we've seen. In fact, it's just the latest in a series of abuse stories that have happened in the United States over time.

Steve Levitt and I and Roland Fryer wrote a paper on crack cocaine and the growth of crack cocaine in the '80s as part of the broader drug abuse story growing in the United States. People have talked about powdered cocaine before that, methamphetamine in the later period. In other words, the United States has been subject to kind of growing drug abuse not just in opioids, but in other things. And you can even see that within the opioid epidemic.

As I mentioned earlier, an increasing fraction of people dying from fentanyl are actually dying with fentanyl not combined with other opioids but combined with other illicit drugs, like cocaine. And that's indicative of the thing I talked about before. You know, the growth in abuse is not just -- has been associated with a lot of factors have been driving abuse, not just now, but driving abuse for a while, and driving abuse of not just opioids, but abuse of drugs more generally.

And that's what you'd expect from an economics standpoint, that if you have that kind of factors driving

abuse, things might change what they abuse, but abuse is going to go up. And that's really been the drug control problem that people have tried to face. How do you deal with, you know, a rising propensity of people to abuse drugs.

Q Professor Murphy, we've covered a lot of ground. I'd like to take you back to the conclusions that you've reached in this case and that you're sharing with the jury.

And now that you've explained some of the factors and the things you've looked at, I'd like you to put them into context of your conclusions. Obviously not covering everything again.

So your first conclusion about "The quantity of prescription opioids consumed is determined by both supply and demand factors."

A That is what I've said so many times, I'm not going to say it too much again. But it just says you don't want to just look at, hey, there were more prescribed over time, therefore, this must be a supply story, that somehow changes on the supply side must have driven things, and that's just not true in this market, not true in any marketplace; that is, quantity's going to be determined by both supply and demand factors.

And secondly, the second point is that we know demand factors have been important. We can see that in so many

ways. We can see that, you know, there was Medicare Part D that increased the prescribing behavior, we had declining prices, we had standards of care changing, and we had the deaths of despair.

We had kind of changing economic conditions that drove an increased demand on the part of individuals for abuse. We had the supply of fentanyl come in in the later period which had a big effect on mortality as a highly-lethal drug was introduced into the illicit supply system.

We also see it when we looked across all those states, that, you know, there is a very weak association between the shipments in the earlier period, which are driven both by supply and demand, but even if you say forget that for a moment, just say I'm going to look at shipments regardless, supply or demand, and how tightly is that associated when he we see mortality today, and the answer is, very weak.

MR. MAJORAS: Professor Murphy, thank you.

Your Honor, I pass the witness.

THE COURT: Okay. Anything from CVS or Walgreens for Dr. Murphy?

MR. SWANSON: No, Your Honor. Thank you.

MR. DELINSKY: No, Your Honor.

THE COURT: Okay. Mr. Lanier, you're up.

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CROSS-EXAMINATION

BY MR. LANIER:

Q Sir, my name is Mark Lanier. I've not had the pleasure of meeting you before, but it's a pleasure to meet you.

A Pleasure to meet you as well.

Q I've got a number of questions for you, as I'm sure you're not surprised to find out, but I'm going to try to keep it very brief and try to keep them as close to yes-or-no questions as I can ask. Okay?

A Yeah, you can -- that's fine.

Q You've given exams before. I bet you've given true/false exams sometime in your life, haven't you?

A I always give true/false and explain your answer exams. That's been the traditional. Chicago's famous for those exams actually.

Q Is that a yes answer or no?

A See, that's the key.

Q Thank you, sir.

A My exam always says true or false --

Q Sir, time out, please. If we could focus on my questions, I'll try and get through this with some speed, okay?

A You asked me about my exams. I'm trying to explain my exams.

Q No, sir, I asked if you've given true/false exams

before. It's a yes-or-no question.

A I've never given an exam that just asked for a true or false answer.

Q Fair enough. Well, you may decide to do that one day.

I want to talk to you about three things. Sir, I want to talk to you about money, I want to talk to you about expertise, and I want to talk to you about science. Okay?

A Okay.

Q Let's start with money.

You spoke about in your direct testimony doctors and others responding to incentives.

Do you remember testifying about that?

A I do.

Q And in fact, you respond to incentives too, don't you?

A Yes.

Q So if someone's getting graded on how they do, you say that affects them, right?

A That's correct.

Q And of course, you know you're getting graded in here, aren't you?

A Yes.

Q So that affects what and how you do things as well, doesn't it?

A It does.

Q And toward that end, I'm trying to chart the money.

Did you say by the end of September you've personally billed $40,000 on this opioid case?

A I believe that's correct.

Q And that there's 300,000 from others? I wasn't charting that.

A Yes.

Q But then you said something about 1.8 million?

A Yes. That's based on not this case, but all the opioid cases I've worked on together.

Q So if we look at all the opioid cases you've worked on so far, you're at 350,000 plus 1.8 million. You've got 2 million bucks, over 2 million?

A I think that's correct.

Q And this is not the only case you're working on in terms of opioids. It isn't the only case, true?

A That's true.

Q I've looked at your CV, and it looks like you've got something over the last four years of about 100 cases you're working on. Is that right?

A No. That would be -- there's a bunch of reports, but many cases have multiple reports. So, for example, that list would include multiple items on the same case, I believe.

Q Well, so we're looking -- so you get to bill for each one of those though, right?

A Yes. They're all part of the same work I do.

Q So you've done the Optical Disc Drive, you've done Parallel Network Licensing, something about Allstate Insurance. You've done Blue Cross Blue Shield, another one against Allstate Insurance. You've done News Corp, you've done patent cases with Biogen, Genentech, Celltrion, Kinney Drugs, Union Pacific Railroad, Bumble Bee Packaged Seafoods, payment cases, antitrust cases.

You've -- that's just the last four years. It keeps going, right?

A Absolutely.

Q Economics has been good to you, hasn't it?

A Yeah, I've done very well in economics.

Q And when you say that you spend most of your time teaching and most of your time at your wood shop, wouldn't you agree you make most of your time -- or you make most of your money doing this?

A I would say this is my biggest source of income these days, yes.

Q So in that regard, I was looking at some of your invoices in this case, which we'll have marked as Demonstrative 119.

You've seen your invoices, I'm sure.

A No.

Q Ms. Fleming's handing you a set.

A I don't get the invoices because I don't work for CRA. I'm a consultant for CRA. I submit my hours to them, and I get reimbursed for my hours, but I don't -- I don't review the bills because I'm not a CRA employee.

Q Well, the jury met another CRA person, Mr. Brunner I believe he pronounced his name, who testified about some similar matters last week.

But, sir, I'm looking at your bills. And if we look at the bills, it looks to me like you've actually done relatively little on this yourself.

So here are the bills for November of 2020, and you didn't bill any time that month. Other people did, right?

A That's correct.

Q And if we go to the next month's bill, 80,000 that month. But again, that's not you, that's other people, right?

A In that month, yes.

Q And if we go to the next month, as y'all are continuing to do all of this work on the report, it's still not you, is it?

A I didn't submit any hours. I probably did some work, but I didn't submit any hours over that period.

Q You were pro bono that month?

A No. I work with my colleagues. I don't always turn my hours in, you know, but --

Q Because the next --

A You know, I mean, I work with my colleagues.

Q The next month you don't turn any time in even though other people turn it in the tenth of an hour, right?

A That's true.

Q That's six minutes. They've got it down to a six-minute time period, don't they?

A I believe they do. Some of them, I guess.

Q That was a hundred grand that month without you working.

If we go to the next month, you're still not doing any work on this case, are you?

A No. I was probably working on other opioid-related matters, but not this one at that time.

Q Uh-huh. That's the Murphy report still being done there. If we get into May of this year, this $407,000 bill, still not seeing you on there. Am I missing it?

A No. I'm not on that bill.

Q You come in when it comes time to testify at court and depositions, right?

A No, I'm there at two times. I primarily put in my work when it comes time to think about the case, what work we need to do, lay out the process that we need to go through to get the answer to questions.

I'm there when we put the report together to say, you

know, have we answered the questions to -- along the way I answer any questions they have about carrying out the instructions we've laid out. And I'm there at the end again to kind of go through the report and say does this accurately reflect what I instructed my staff to do.

Q And right now you're billing $1400 an hour to be in here today?

A I believe that's correct, yes.

Q Okay. Let's move from money to expertise, and see what they get for that. All right?

A couple of expertise questions.

Now, you're here to testify about causation, right?

A That's part of what I'm here to testify, yes.

Q All right. Well, on your expertise, causation, typically I would think we'd hear from an epidemiologist.

Are you an epidemiologist?

A I would say two things. One, I'm not an epidemiologist, but economists are very important in the area of causation. In fact, the most recent Nobel Prize, which was just awarded a month ago, was given to economists precisely for looking at causation issues.

Q Sir, I asked you are you an epidemiologist, and the answer to that is?

A I'm not an epidemiologist, but you prefaced it --

Q Thank you.

A -- by you said causation would generally be associated with epidemiology. I thought it would be useful for people to understand that the most recent Nobel Prize was awarded to three economists for work they did precisely on causation.

Q It wasn't awarded to you, was it?

A I was not part of that Nobel Prize, no.

Q All right. Now --

A Your point is about epidemiology and causation, and my point is economists are very big on causation.

Q And in that regard, did you use Bradford Hill criteria for causation?

A I did not, but nor would economists generally use those criteria.

Q And have you published your views specifically concerning opioids and death?

A I don't think I have a publication specifically on opioids and death. I do have publications on overdose deaths, but not specific to opioids.

Q Well, I've read those publications. You've got three that I could find, is that right, where you include that into the publication.

A I would have publications that look at mortality broadly, including mortality from various causes.

Q Exactly. So in that regard, I'd like to ask you some

questions about expertise, and I'm going to contrast you with Katherine Keyes, Dr. Keyes, from Columbia.

Now, have you ever met Dr. Keyes?

A I have not.

Q You did have a chance to look at her CV, for example, right?

A Yes.

Q Attached to her report.

And she is someone who's been dealing with this specific subject for 20-plus years.

Did you know that?

A I assume so. I don't remember it was 20 years.

Q And when we looked at all of her different awards and all of her different prizes she's won, so many of them were dealing with these specific issues.

Were your three awards that you won dealing with these specific issues?

A When you say "these specific issues," you mean?

Q Opioids.

A No, not specific to opioids. More on social decline and the effect of that on people generally. That's what I won my awards for.

Q Now, Dr. Keyes was careful in giving us her graphs, like you see here in front of us, which was in her expert report, and giving the citations to it, the CDC, the Center

for Disease Control, for example, and explaining how she gets her specific data.

Remember that?

A I didn't -- I wasn't here for her testimony. I think her report does talk about where she got her data.

Q Yeah, this chart's in her report, okay? This chart, "Prevalence of opioid use disorder in the United States, Ohio, Lake and Trumbull County."

You're not fussing the accuracy of her graphs, are you?

A There are some of them that are very misleading and some of her opioid use disorder calculations are highly flawed. I haven't talked about that today, but if you're going to point that out, there are some serious problems with what she did.

Q Well, we'll point to some of the issues with yours too as time allows me, but --

MR. LANIER: My choice of time, Your Honor.

Q -- but within the framework of that, you've got a bunch of charts that you put up there today for the jury, right?

A I do.

Q And your --

A It cites my report.

Q Yeah. Yours is the source is you, right?

A No. Besides my report, I have an appendix in my report that goes into great detail of how all those numbers are calculated. Rather than just put numbers at the bottom of a table, I actually refer to an appendix, and that appendix details step by step how we process the data.

Q Well, with due respect, sir, you look at your things like talking about how the costs covered by Medicare increased in 2006, and you showed this chart and spent time explaining it.

This only applies to senior citizens, doesn't it?

A Yes.

Q This breakdown of percentages as share of spending, it doesn't say what percentage of opioids they're getting, does it?

A No. We've done that in other charts, here -- some of that in here and some of that in the report.

Q And in this regard, as you've testified today, would you agree you're a bit of a fish out of water on dealing with some of the terms that are involved in the opioid epidemic?

A I don't know if -- I mean, there are certainly terms that are more epidemiological in nature, but there are others that are more economic in nature. So I would say everybody is crossing over a little bit.

Q Well, what I was thinking of specifically was, for

example, you said there's no sense of oversupply in economics, in reference to the testimony and questions about oversupply. Right?

A Yes, certainly the way she uses that term.

Q Yet that word does have meaning in the healthcare world apart from the economic world. Did you know that?

A I don't know how they use that term, but if they use it the way she used it, it's a problem.

Q Well, if oversupply means more than needed, more than medically necessary, you think that's a problem?

A No, I think that's one way you could look at trying to calibrate supply, would be to compare it to some measure of medical need. However, you've got to be careful because the usage and shipments are not just going to depend on overall need. It's also going to depend on costs.

You know, in 2006, when there were more opioids shifted to the older individuals, one it was because their costs went down. When costs went down, doctors prescribed more.

Q In fairness though, if you'll look at some of the qualifications of Dr. Keyes, she's a journal reviewer for *Addiction; Alcoholism: Clinical and Experimental Research*.

Have you been a journal reviewer for *Addiction*?

A I've done review for *Addiction.* Not for that article but -- that journal, but I've done reviews for *Addiction*,

yes.

Q No, for that journal, sir.

A Oh --

Q The *Journal of Addiction*.

A I don't think I reviewed for that particular journal.

Q How about the *American Journal of Epidemiology*?

A That would not be a journal I would work with.

Q *American Journal of Psychiatry*?

A No, I don't think I did.

Q *American Journal of Public Health*?

A I think I have reviewed for them, actually.

Q How long ago?

A I don't know.

Q Are we talking the last six months, last year?

A Wouldn't have been in the last year.

Q Last decade?

A Probably.

Q Have you read any of her multiple publications on these subjects?

A I've read -- I've read some of the stuff she did. I read quite a few of the things that she cited in her report.

Q And in fairness, she doesn't have three articles. She's got hundreds of articles that bear on this, doesn't she?

A Yes. I mean, fields differ quite a bit in terms of

publications.

Q Now, you spoke about the economic decline and the isolation that you put down as part of the cause of this epidemic, right?

A Yes.

Q And I don't know that anybody's really fussing that point, but my question to you is this: Have you ever heard of the concept "preying on the vulnerable"?

A I've heard of that.

Q So, for example, you use a chart that you do reference from Case and Deaton.

Do you remember that?

A I do.

Q I'm going to show you what's been marked as Defendants' MDL 1666. You're familiar with this write-up by Case and Deaton, "Deaths of Despair redux: A response to Christopher Ruhm," aren't you?

A I am.

Q And these people whose chart you used in front of this jury say, "We directly contradict the idea that deaths are related to economic conditions from 1999 to 2015; indeed, we went to great pains to show that this was not the case."

That's what they say, isn't it?

A Now you're really being misleading, unfortunately, because what they're saying in this response is that it was

long-term decline, not just the decline in that period. They were making this point of short-term versus long-term, which has been Case and Deaton's point on this from the beginning.

Q With due respect, I'm not misleading because I'm not done yet.

A Okay.

Q My question to you, sir, is, what they did say is the opioid epidemic poured fuel on the fire, didn't they?

A They're saying that opioid epidemic came on top of that long-term decline. If you want to call that fuel on the fire, I think that may be terms they use.

Q "We do not discount the importance of the opioid epidemic, but we regard it as having added fuel to an already bad situation and certainly not the only cause of increasing mortality."

Do you see that, sir?

A Yes. So they're saying the opioid epidemic's not the only cause, is what they're saying.

Q And they're not the only ones who have published on this clearly.

You're familiar with the Kevin Griffith publication, aren't you?

A I believe so.

Q That's in *Drug and Alcohol Dependence*. I'm assuming

you've not been a journal reviewer for them either, have you?

A I may have. I don't recall being; I may have.

Q You are familiar with the article on The Implications of County-Level Variation in U.S. Opioid Distribution, aren't you?

A I've seen it. I can't say I recall it.

Q Well, you know, when you get an article in a peer-reviewed publication, they'll most often put an abstract at the front that's kind of like a condensation of the article, right?

A That's what an abstract tries to do.

Q Yeah. And two abbreviations are important for us to pick up here.

One is "opioid-related deaths" are ORDs.

Do you see that?

A Yes.

Q And the other is "per capita pill volume," or PCPV.

Do you see that?

A I do.

Q And their results that they found from their study is "In adjusted models, a one-pill increase in per capita pill volume was associated with a .2 percent increase in opioid-related deaths per 100,000 in the population."

Do you see that?

A I do.

Q They say, "Our findings validate the relationship between per capita pill volume and opioid-related deaths."

Do you see that?

A I do.

Q "They do identify important environmental drivers of the opioid epidemic and suggest early state Medicaid expansions were beneficial in reducing opioid pill volume."

Do you see that as well?

A I do.

Q Now, sir, we've got two counties here with both roughly 200,000 people. Help me do the math, please.

For a one-pill increase, let's say we've got a, between these defendants hypothetically, 30-pill increase some years in per capita pill volume.

Do the math for me. How many deaths, opioid-related deaths, would that be associated with in two counties, so a total of 400,000 people?

A So you'd have to take the .2 per hundred thousand, multiply that by 30, and then multiply that by 4.

Q And what do you get?

A I don't know. .30 times .2 is 6, times 4 is 24. Although that wouldn't tell you that's the causal relationship between one and the other, right? This is an association.

Q I understand.

A And so I'm not sure what that tells you. It doesn't tell you what supply --

Q I'm asking you to do the math, sir. Do you need me to work it out longhand?

A Sure, you can. I did it in my head, but you can work it out.

Q What did you get?

A I don't know, assuming I did it right and I'm doing this off the fly, so I can't say -- I would normally not want to do this on the fly.

You're saying a one-pill increase.

Q I don't want you to do it on the fly, sir. Let's do it together and let's make sure the record is correct, okay?

A Okay.

Q Here we've got one pill equals .20 deaths per 100,000.

Right?

So 30 pills should equal 30 times .2.

A 6.

Q Which is going to be 60; is that right?

A No.

Q 6. Thank you.

A That's what I said earlier, 6. Get rid of the zero.

Q 6 deaths, 6.0, per 100,000. And we've got 4 of those one hundred thousands. So we're looking at 24 deaths in

these counties associated with that number of pills being put out in a year, right?

A Well, I mean, assuming we're reading their numbers right, which is always an assumption in doing something like this; but if we're reading those numbers right, that's what their numbers would say in terms of some association, places that had more pills had more deaths. But we know that association's pretty weak when you look across either counties or states.

Q Well, you say that -- when you say "we know," you're not including Dr. Keyes and all of her publications that have been peer reviewed, are you?

A I don't think she has any publications that talk about the overall strength of that relationship, that I'm aware of.

Q And she -- well, you're certainly not including her in your "we." We'll let her publications speak for themselves.

Are you?

A I was very -- I was including her because I haven't seen anything she put forward that would say there was a strong association between shipments and mortality across states or counties.

Q She used the Bradford Hill criteria to establish causation in the place of association. You didn't use that criteria, did you?

A You're mixing apples and oranges now.

Q No, sir, I'm not.

A She did not establish a causation across states between shipments and mortality.

Q Sir, I'm talking about in these counties. I'm talking about the oversupply.

You didn't use Bradford Hill, did you?

A She didn't use -- Bradford Hill is a broader set of criteria, and she didn't use Bradford Hill about this counties --

Q She did.

A She used Bradford Hill about overall studies.

Q Sir, you weren't in here to hear her testimony. I'm not challenging you on that.

My question to you is simple. Did you use Bradford Hill for anything at all?

A I did not. Economists do not rely on Bradford Hill.

Q Last stop on the road. Science.

You know who Dr. Lembke is, Anna Lembke, don't you?

A I do.

Q She talked about what addiction is and how it affects someone.

You're not a doctor to talk about such things, are you?

A I'm not a doctor. I'm an economist.

Q You're not in a position to talk about how it increases depression, decreases cognition, increases pain, increases fatigue. Those are outside your areas, aren't they?

A Yeah, those are medical terms.

Q But as an economist, you know it's a whole lot harder to get a job and keep a job if you're depressed, isn't it?

MR. MAJORAS: Objection, scope. This witness never talked about Dr. Lembke.

THE COURT: Well, overruled. He can ask that question.

A Yeah, I have not done a specific study of that. I know mental health is associated with employment. It is tougher to get employment when you have mental health issues, including depression.

Q Yeah, it's tough to get and hold a job if your cognition is messed up, if you're not thinking clearly, true?

A That's true.

Q It's tough to get and hold a job if you're in pain. You know that, don't you?

A I think that would be a factor too.

Q It's tough to keep and hold a job, to show up for work, to be reliable, if you're suffering from debilitating fatigue, isn't it?

A Fatigue kind of goes both ways. You get tired from working, but you also -- it's harder to work when you're tired.

Q Now, you're also not in the position to testify about the dopamine learning loop in the way the brain works in regards to addiction, are you?

MR. MAJORAS: Objection. Scope.

MR. LANIER: It's going to gateway, Your Honor.

THE COURT: All right, fine.

A I am not a biologist. I can't tell you about that mechanism. I can tell you a lot about the economics of addiction, but not that part.

Q That's my point I just want to underscore. When you're talking about addiction, you're not talking about it as an addiction specialist in the world of neuroscience, talking about what's happening to the brain, right?

A No, I'm looking at it as it unfolds in people's lives in terms of actually addictive behavior.

Q And that's why when you do writings like you did -- you talked about a theory of rational addiction that you co-wrote with Gary Becker.

Remember that?

A Yes.

Q Your attitude to someone who's addicted is "just

quit," isn't it?

A No. We actually talked about how hard it is to quit and why difficulty in quitting is a big part of the addiction story.

Q So on page 693, "The claim of some heavy drinkers and smokers that they want to quit but cannot end their addictions seems to us no different from the claims of a single person that they want to but are unable to marry, or from the claims of a disorganized person that they want to become better organized."

Did you write those words?

A We did.

Q And you wrote those from your perspective, but not from the perspective of how the addiction changes the brain, correct?

A No, we did not study the brain. That's outside our area of expertise.

Q Okay. Thank you, sir.

MR. LANIER: Your Honor, I'll pass the witness.

THE COURT: Okay. I think what I'll do, we'll get questions from the jurors, then we'll break for lunch. And then in the next round counsel can decide which ones to ask.

So we'll break for lunch, pick up at 1:00 with the

balance of Dr. Murphy's testimony.

And the usual admonitions apply. Have a good lunch.

(The jury is not present.)

(Juror question review.)

(A luncheon recess was taken at 11:55 a.m.)

A F T E R N O O N S E S S I O N

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(In open court at 1:04 p.m.)

MR. MAJORAS: Your Honor, before the jury, I think Mr. Delinsky was going to respond to your question this morning.

MR. DELINSKY: Judge, I think we're all good on one week from Monday.

MR. MAJORAS: For closings.

THE COURT: The plaintiffs are okay with that?

MR. LANIER: Yes, Your Honor.

THE COURT: Okay. That's what we'll plan to do.

MR. MAJORAS: Thank you, Your Honor.

(The jury is present at 1:05 p.m.)

THE COURT: Okay. Please be seated. I hope everyone had a good lunch.

All right, Dr. Murphy, I want to advise you you are still under oath from this morning.

And Mr. Majoras, you're up.

MR. MAJORAS: Thank you, Your Honor.

Good afternoon, folks.

Good afternoon, Dr. Murphy.

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REDIRECT EXAMINATION

BY MR. MAJORAS:

Q At this point with the witnesses, Judge Polster has asked the jurors if they have questions. They write them down and we can ask them.

And what I'm going to do is put the questions up on the screen so you'll have it in front of you. I'll read it so it's in the record.

If you can respond, respond. If for some reason it's not within your area of knowledge or expertise, please tell us that.

Fair enough?

A I'll do my best.

Q Let me cover it up so we're just looking at one.

Okay. So our first question is, "When you look at the fentanyl deaths, how are you determining if it is illicit fentanyl or prescription fentanyl?"

A Good question.

You can't, because it's the guy doing the -- you know, you can't tell the chemical difference between the two at that time, so they get lumped in together.

So when we do licit versus illicit, fentanyl is included in the illicit category even though there's some prescription fentanyl in there. That's just all you can do with the available data. So we can't separate those two out.

Q Okay. Then our second question.

Now, I will tell you there are a couple questions that refer to your charts. You have a binder in front of you where you have all of the charts together. I may need your help to try to identify which chart is which on any particular question, if it's not listed.

"Based on your chart where the peak of prescription opioids meet and the decrease of prescription opioids start to decline, fentanyl increase, is the increase due to easier access to illicit fentanyl?"

A I think if we look at the chart, I can show you there's actually a bit of a delay there.

Q Why don't we, if you can, identify the chart, and let's put that up.

A So we might have to look at two, so let's look at the chart that has shipments and -- yeah, one of the charts was shipments in it, so we can look at that.

Q Can you help me identify that?

A Sure. 30-something, 37, maybe around there someplace.

Okay, yeah. So this is -- 30's good.

So here we see shipments, which is, you know, those are all prescription. We don't have shipments in any sense of illicit. So this is all prescriptions, in other words.

You can see they kind of peak around 2010 and '11, and then start going down.

If you flip to the chart, I think you just showed it right before this, whereas what seems to happen is the fentanyl increase really starts a little later, starts around 2013. So remember, the prescription opioids start going down -- level off in '10, '11, start going down. Fentanyl really comes in much more after 2013. It doesn't come in right when the prescription opioids go down.

Heroin, which had already been rising, continues to rise in that earlier period, in that period afterward; maybe accelerates somewhat during that period, but it continues to rise. But the fentanyl is delayed. The fentanyl comes in like 2013.

Q Let me read this. It looks like the way I used to write some of my answers in my law school exam, so I appreciate it.

"In regard to shipments and the mortality chart, how many people live in Nevada?"

Let me just read the whole thing, and you can address it.

"How many people live in Ohio? How many people in Nevada have opioid abuse disorder? How many people in Ohio have opioid abuse disorder?"

And you can take that in whatever order you'd like.

A Nevada is a much smaller state than Illinois -- I'm sorry, Ohio, but we're doing everything per capita, so it's

not -- it's per person; so the fact that's smaller doesn't have a direct effect on the way we're measuring everything in the chart, because everything's per person.

So if Ohio is six times as big, we've divided everything by a population, it's correspondingly bigger. So I don't think size is really that critical for interpreting those charts.

Opioid use disorder, I don't know the numbers for Nevada. I wish I did. I just don't off the top of my head.

Ohio has had relative high rates of opioid use disorder. Of the statistics, it would be one of the ones where they're closer to the top than they are for other measures of opioids.

Q Next question is, "What is the percentage of opioid prescription mortality among women? The chart you've provided showed 33.3 percent of women getting opioid prescriptions. How many women die from --

UNIDENTIFIED SPEAKER: Push it up, John.

Q I'll break this into its individual parts.

A I understand the question. The question is really about, you know, in that earlier period where we saw the older women disproportionately getting the prescriptions, does that show up in mortality. And the issue is you do see higher rates of mortality for women, older women in those earlier years; not proportionately higher, but you do see if

you look at mortality rather than prescriptions, you'll see that mortality also shifted dramatically from older women and men to younger men particularly.

So you can do that same analysis without looking at prescriptions. You can just look at mortality in the early period and mortality in the later period, and you also see a dramatic shift there too, that there's a big shift in the mortality distributions.

Q If you wouldn't mind, just take a look at the full set of questions to make sure you responded as far as you can.

A Yeah. I tried to add to that. Putting a number on that is hard, but I can tell you if you look at which -- you know, look at like a bar chart that showed you who was dying, it would have been more skewed toward older women in the earlier period than it was in the later period because, you know, part of that's because there were more of them getting prescriptions in that period.

So it's less dramatic than the comparison I had, which was prescriptions early period to mortality later period. You go to mortality, mortality sees the same pattern; shift toward men, shift toward younger, somewhat less dramatic.

That would be the answer.

Q So I know you've answered, but I'm just going to read the full -- the second question into the record so we have it in the record.

"The chart you've provided showed 33.3 percent women getting opioid prescriptions. How many women die from opioid prescriptions between the years 2000-2017," [sic] which this juror thought was part of the data that you used.

Anything else to add?

A I would just say it's not 33 percent of the women were getting prescriptions. 33 percent of the people getting prescriptions were older women. So those percentages in that chart add up to 100. So 33 percent are older women, 20-something percent are older men, and all those percentages would add up, okay? So it wouldn't be as high, that wouldn't be the number for that.

But the pattern is exactly what I said.

Q Why does the pattern matter?

A Because primarily disproportionately older women getting prescriptions in that earlier period and younger men dying from opioid mortality in the later period.

Q I frankly can't remember if this is the one I asked you already.

A I think it is.

Q It is, yes. We had a few questions about fentanyl, so thank you.

All right. Next question.

A By the way, that's a very good question, because that was something that I didn't make clear, so I'm glad somebody

asked it.

Q This question relates to another chart you used. "Shipments within 1993 to 1995 and 2018 to 2019 is missing by time frame of '96 to 2017. The data this is missing during this time frame can make a major difference in showing MME mortality shift, can it not? Please explain. Why wasn't the full data used?"

And if you need a chart, let me know?

A Again, let's -- can we put the chart up? I just want to make sure people understand what we're doing.

Q I just may need your help in finding it.

A So it's the scatter charts. So go down. Keep going. It's the dot -- the charts with all the dots on them.

Okay. So the shipments are the full period 1997 to 2010. That includes all of those years. That's 14 years of shipments are on the horizontal axis.

The vertical axis is the change in deaths, so we're comparing for each state the death rate per hundred thousand in 2018-19 compared to what the death rate was for that same state from 1993 to 1995.

So for example, if you look at Ohio and you see let's say that number in Ohio is 35. That's as close as I can get looking at the chart. That number is 35. Maybe it went from 6 in the first period to 41 in the ending period, and therefore it's a change of 35. That's what we're referring

to.

So the two years I'm looking at here, 1993 to '95, is the base period we're looking at for the change, and 2018-19 is the ending period we're looking at for the change.

So we're saying how much did mortality rise in a state over that period of time. And we're comparing the rise in mortality over that roughly, you know, 25-year period to the level of shipments in that early period.

So the idea is, did places that have more shipments see their opioid prices or their opioid deaths go up by more. So we're kind of trying to control for the baseline level.

It looks pretty similar if you just do deaths in 2018-19 because the baseline levels are low, but I think -- that's why we did it this way.

MR. MAJORAS: Mr. Ferry, I think you should keep in mind slide 37. I think we may come back to that later.

Q Next question.

MR. MAJORAS: This relates to slide 4, Mr. Ferry, if you could pull that up, please.

Q I'll read just so it's in the record. The question is, "Increase in mortality is because there is an epidemic in Ohio, correct?"

If we look at slide 40.

A Yeah. I mean, I would say they're clearly referring to the same thing. I think mortality is a big part of what people are talking about with an epidemic. They're saying what tells me we have an epidemic, right? Epidemic is a term we use to describe a situation where from a health standpoint things are -- or from a general standpoint things have gotten larger. And one of the big things they're looking at when they declare it to be an epidemic is the mortality rate.

So I would say the two are kind of telling you the same story, that if we're having an epidemic of opioid abuse, then that's showing up as mortality. And, you know, if people weren't abusing opioids today, primarily heroin and fentanyl, we probably wouldn't have the level of mortality from opioids we have today.

Q You can go back to the ELMO, please.

"You mentioned incentivized when speaking about the hospitals and measuring level of pain, fifth sign, as we have heard, with the surveys. Therefore were they, the hospitals, paid to get these pain medications, oxy and hydro, in the hands of patients"?

A You know, what I'm talking about here is the incentives that were provided by the CMS surveys. I don't think there was a direct payment that said if you -- from CMS -- I know there wasn't -- where they would say, if you

give this much prescription payments, you get this much -- I mean this much prescription medication, you're going to get this money directly from CMS. But at least initially it was something CMS was monitoring, which has had some effect on doctor behavior.

And secondly, later it did figure into, in a less direct way, a financial incentive for the hospital. But it wasn't like that direct, I guess is the way I would think about it.

Q Next question. "When gathering data, which chart were deaths added if prescriptions and illegal drugs were recorded at the same time?"

A Yeah, so I think we can put that chart up. If you put the chart up that has the three green lines on it -- or the blue line and the two green lines. There it is.

So this chart breaks all three out. So in a given year, let's say, you know, let's, like, go 2019, the height of that blue line is how many people died of a drug overdose in which there were only prescription opioids involved, no other illegal opioids involved. So the blue is someone just prescription opioids, no illicit opioids.

The light green would be people for whom there were illicit opioids but no prescription opioids.

So, again, that one said pure illicit or illegal, that's the light green. The blue is pure just prescription

opioids involved.

And then the dark green is the people for whom you found both types of opioids. So that would be somebody who died and when they examined what was in their system, they had both prescription opioids and illegal opioids. So that would be the dark green area.

So I break all three out for you. Just one, just the other, and both. That's in this chart.

Q And you may have mentioned this when I asked you questions earlier, but the blue part, the prescription opioids, are those only opioids that were used by the people actually getting the prescription?

A No. Those would include people abusing prescription opioids as well as people who would have prescriptions for prescription opioids. That's not broken out. This is from -- this is from death records where you're just recording what was the cause of death and linking that to the presence of drugs.

I should also say, for each of these drug overdoses, there could be other drugs too. It doesn't have to just be these. Here I'm just asking were there prescription opioids only; in other words, no illicit opioids; were there only illicit opioids, no prescription opioids; and were there both. That's what this chart breaks out.

MR. MAJORAS: Mr. Pitts, if we can go back to

the monitor.

Q Next question. "Between 2001 to 2010, 19.5 percent of opioid prescriptions were for men ages 15 to 50. Wouldn't the majority of these men still be in the same age grouping in 2011 to 2019 and more likely to abuse heroin if they had lost their jobs?"

A Yes. I mean, if you think of these two periods as like ten years apart and our age grouping is, what, 35 years wide, right? So that means I had 35 years of people at the beginning. I shift to the later period, so ten years of older people are no longer in that group because the oldest guys in the earlier period are now out. And the earlier -- and then they're bringing in ten years of people at the beginning.

So there would be 25 years of people with overlap, 10 years of people leaving, and 10 years of people coming in. So there would be a bunch that would be in the group in both periods.

Would those abusing drug -- abusing -- or getting prescription opioids in the earlier period, I think the evidence on this is mostly not about people receiving the prescriptions. The evidence on, you know, how that leads to abuse is mostly people who are abusing prescription opioids. That is most of the data we see that talks about people who are using prescription opioids at one point and using heroin

later, is about people who are abusing prescription opioids in that earlier period. Those may -- most of those people wouldn't have had a prescription for those opioids. They would have obtained them in some other way.

So in my chart it's about prescriptions.

Q The next question's going to refer to your scatter plots again, but before we do that, let me put it on the screen and read it to you, and then we'll switch the monitors.

"Which dot on your scatter plot (the changes in the opioid mortality in a state versus the shipments of prescription opioids to the state) is the state of Florida?"

This might be I think 37.

A You know, I don't remember specifically. My -- I don't want to -- I'm not going to speculate, but I can tell you my recollection is Florida was relatively high on I think shipments and relatively low on -- I'm not going to guess. I'm not going to guess. I can't tell you which dot they are.

I'm trying to remember, but --

Q If you can't remember, you can't remember.

A I don't remember.

Q Thank you.

Next question. "People of the Medicare age, are what percentage of people with prescription addiction? And

second, same question with related to death."

A I wouldn't know the numbers off the top of my head. I would know, like I said before, that the older individuals were more highly represented among deaths in the early period than they were in the later period. That's the only part I remember of that, that they were more highly represented in deaths in that earlier period than they were in the later period. I couldn't tell you the numbers.

Q And this last of the juror questions: "When opioid shipments began to decline after 2010 to 2011, could the substitute theory apply for people who abuse/misuse," in other words, "not mortality?"

A Yeah, there really are two substitute theories. And again, this is something I tried make clear.

One is substitution that I'm using prescription opioids if they become less available, I might shift to another opioid, like an illicit opioid. That's particularly true for those who are abusing opioids. But the other one is people who are going to become abusers are now more likely to initiate on illicit opioids.

So there's two substitution effects. There's a substitution among those currently using, but there's also a substitution among those initiating. And it's that second group initiating on illegal opioids that pushes -- you know, that is important during this period that you have to think

about.

Q I have just a question or two of my own.

Mr. Lanier asked you some questions about the Bradford Hill criteria.

Do you recall that?

A Yes.

Q You gave some responses, but I'm just going to ask you, what is the significance, or not, of the Bradford Hill criteria in doing the type of causation analysis that you have offered here?

A Well, I don't think it -- I mean, some of the things that the Bradford Hill talk about are things we discuss in economics when it comes to causation. So it's not like there's not an overlap, it's just that those aren't the criteria that economists generally use.

But I do want to make clear economists have been leaders in the push for causal identification. And the most recent Nobel Prize, and particularly the work of Josh Angrist and Guido Imbens, probably the two people who pioneered a lot of the causal inference in economics, had big influence outside of economics. It's become really a big focus of people thinking about causality.

The other thing about causality that you have to be really important with is at what level are we talking about causality? Because, you know, you can prove causality

between A and B, but if what you're doing affects not just A, affects C, D, E, and F, then the causality question you're interested in is not just the A to B link, it's the B to -- C to B and D to B and E to B, and the relationship among those.

So whenever you talk about causality, and this is again an area where economists have had a big role, to say the causality question has to be done in the proper context given the issue you're addressing, that is; and you know, Josh, Josh Angrist, has been very clear about that, you know, he's always talking about the limits of what I can learn from a given causality experiment. He's big on finding a causality experiment, but often that doesn't go all the way to answering the questions. It's just a piece of the question.

Q So taking that into the analysis that you did and the issues that you addressed in this case, using what you just said, is this an A to B type of discussion or is it more the A to B, C, D, E, or whatever number -- letter?

A Well, I think it's more the latter, because, you know, changes in what happened over time had an effect on our outcomes on many different dimensions. It wasn't just about those using prescription or abusing prescription opioids, what did they do; it was what about happened to all the other people and what happened with the introduction to

fentanyl, and those other things.

So you've really got to consider those other things.

MR. MAJORAS: Thank you, Professor Murphy.

I pass the witness, Your Honor.

THE COURT: Okay. I assume there's nothing from CVS or Walgreens, but I want to inquire.

MR. SWANSON: Nothing, Your Honor. Thanks.

MR. DELINSKY: Nothing.

THE COURT: Okay, Mr. Lanier.

MR. LANIER: Very brief follow-up, Your Honor.

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RECROSS-EXAMINATION

BY MR. LANIER:

Q Bradford Hill criteria you were asked about?

A Yes.

Q You don't use those at all in coming to your conclusions, fair?

A I use some of those criteria, and I didn't get them from --

Q I'm sorry?

A I used some of those criteria. I didn't get them from Bradford Hill.

Q Been around for causation for 70 years, Bradford Hill criteria, right?

A You know, he wrote that paper a long time ago. I

think -- he didn't originate many of those ideas. Other people had had them before, but he put them down. There's a lot of work on causation since then.

Q Yeah. Next question.

You were asked by the jury about how this -- how many of these people got the -- had fentanyl, licit, illicit; how many of them got their starts and the generational gaps.

Do you remember those questions?

A I do.

Q I'd like to ask you, I would assume you are familiar with the work that the Ohio -- the State Medical Board of Ohio has done on looking at this issue, as shown to you by Plaintiffs' 17422. Correct?

A I don't recall specifically this document, so you'll have to go through it with me.

Q Let me show you the page and see if you recall this at all.

Looking at OARRS data.

You know what OARRS is, right?

A Yes.

Q Showing that the unintentional overdoses in 2016 of 4,050, that 3,271 showed themselves present in the OARRS data as having prescription opioids.

Did you take that statistic into account?

A This statistic does not cover all the ones we're

looking at here, so --

Q Well, my question to you is, the specific data in Ohio from OARRS that shows of 100 percent of unintentional overdoses, 80 percent of them have opioid prescriptions in OARRS, did you take that into account?

A I don't believe that's correct.

Q Okay. How about of the unintentional heroin involved, of the 1,444, you've got 1,144 or just under 80 percent showing the use of opioids from OARRS.

A You know, I would have to go through what they're saying here. These are not what you would get from death certificate data, I can tell you that.

Q Well, so the State Medical Board of Ohio that's charged to try and keep up with this, that's charged with combatting this opioid overdose, shows that of unintentional fentanyl, you've got just under 80 percent that are also present with prescription opioids in OARRS.

Didn't take that into account either, did you?

A Yeah, I think -- I don't believe this is what that's saying. But you can present it at what you think, but that's inconsistent with the data that I've seen, inconsistent with the data your own experts have relied upon. So I don't believe that's correct.

Q Well, I'm not making this up where it says "The link between prescription opioids and illicit opioids."

Do you see that on the slide?

A Yeah. Let me read the document you gave me so I can see what they're talking about and not what you want to say it is.

Q All right. You can hang on to that copy and read it.

Meanwhile, I want to ask you about this.

MR. MAJORAS: Your Honor, is he going to ask questions if he wants him to read it, or are we moving on?

THE COURT: Well, I don't know.

Q Sir, I'm through asking questions on that document. You can hang onto that copy though and read it, and supplement it any way you want to.

My final questions are these.

You look at the opioid use disorders in northeastern Ohio, you look at the overdoses. You'll agree with me that these aren't bad people in northeastern Ohio, just having trouble handling tough luck. You'll agree with me on that, won't you?

A They're not bad people. I'll agree with that. I think a lot of them have had tough luck.

Q But these folks in northeastern Ohio, it's not fair for you to sit up there and say they can't handle the tough luck and that's why they're overdosing. That's not fair, is it?

A I never intended to say that. If it sounded like I

was blaming them for their problems, that it was their weakness, that's completely out of bounds with what I was trying to say.

Q And that they have tough economic times, and you say that that's the reason they're turning to this.

That's not fair either, is it?

A Well, one of the reasons is tough economic times. We know that that's a reason why people turn to abuse. That is one of the reasons. There's a lot of reasons people turn to substance abuse, and tough times is one of them.

Q Before you say that about the people in northeastern Ohio, how many of them have you met?

A I don't know. I know quite a few people from Ohio.

Q Do you know Jason Boyd?

MR. MAJORAS: Objection. Scope.

THE COURT: Overruled.

A I do not know Mr. Boyd.

Q Do you know Maria Fleming?

A No, I don't believe I --

Q Do you know Frank Gallucci?

A I don't.

Q Do you think that just because economic times are tough all over the country or particularly in northeastern Ohio, that that's the cause of this opioid epidemic?

A It's part of the story.

Q And you don't think oversupply and overdispensing is part of the story?

A I'm saying it's part of the story. You know, when you say is the growth in usage part of the story, obviously growth in usage is, but growth in usage is due to many factors, not what you want to say, supply factors.

Q Including overdispensing -- although, time out.

You have a footnote in your report that says you didn't consider any of the bad conduct of the defendants in coming to your conclusions, don't you?

MR. MAJORAS: Objection. Scope.

THE COURT: Overruled.

A I don't believe I -- I have not -- I didn't explicitly, I wasn't asked to evaluate their explicit conduct.

Q Note 9. "I do not specifically address the alleged unlawful conduct of chain pharmacies in this report. I understand other experts do." Correct?

A Correct.

MR. LANIER: Pass the witness, Your Honor. Thank you.

THE COURT: Okay. Dr. Murphy, thank you very much. Safe travels returning.

You may be excused.

THE WITNESS: Thank you.

MR. MAJORAS: Your Honor, if I may show Professor Murphy out. Someone else will call the next witness.

THE COURT: Absolutely.

MR. BUSH: We're calling Dr. Choi, Your Honor.

THE COURT: Okay. Thank you.

MR. BUSH: Just give us a minute, Your Honor, to finish getting set up.

THE COURT: All right. Mr. Pitts is cleaning up the jury box as well.

(Pause in proceedings.)

THE COURT: Doctor, if you would raise your right hand, please.

(Witness sworn.)

THE COURT: Thank you. You may remove your mask while testifying.

THE WITNESS: Thank you, Your Honor.

MR. BUSH: Almost ready, Your Honor. A few more logistics.

Mr. Pitts, can you put the screen up, the slides up?

(Pause in proceedings.)

MR. BUSH: May I proceed, Your Honor?

THE COURT: Yes, Mr. Bush.

MR. BUSH: So, ladies and gentlemen, Graeme Bush representing CVS.

Good afternoon, Dr. Choi.

THE WITNESS: Good afternoon.

WILLIAM CHOI

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DIRECT EXAMINATION

BY MR. BUSH:

Q Could you please introduce yourself to the jury.

A Good afternoon. My name is William Choi.

Q We're going to get into your opinions in some more detail, but right up front, could you kind of orient the jury about what you're going to be talking about?

First of all, is one of your specialties, and we'll go through some of your other specialties, but is one of your specialties data analysis?

A That's correct.

Q And have you examined some of the data in this case relating to the dispensing of opioids by CVS, opioid medications by CVS in Lake and Trumbull County?

A That's correct.

Q And what was -- as you've looked at that dispensing data, what was the purpose for looking at it?

A Well, first it was to review and analyze the data. When you're doing data analysis, I know this is going to sound like common sense, but you want to first understand what you're working with, what the data set could tell you;

also what's not in the data and what's missing from the data.

So you want to know what you're ultimately working with to provide information about the subject matter and also to provide context when you do applications of the data or when you run applications of the data.

Q And did you also have the opportunity to review data that was used by plaintiffs' experts in this case, Mr. Catizone and Dr. McCann?

A That's correct, I reviewed those data sets.

Q And did you have the opportunity to evaluate their use of the data and come to conclusions about whether it was valid and reliable?

A That's correct.

Q And you're prepared to express opinions on that subject today?

A Yes, sir.

Q Let me ask you to take a look at this next slide.

Is this a graphic illustration of what Mr. Catizone and Dr. McCann claimed to have been doing in their analysis of the data and the application of red flags for that data?

A Yes, this is an illustration that I created.

Q Can you explain it to the jury, please?

A Sure. So what this slide is attempting to demonstrate or illustrate is what Mr. Catizone and Dr. McCann claimed to

be doing with the dispensing data. I'm going to use a very common metaphor, and that's something you've probably heard before, separate the wheat from the chaff.

Another way of thinking about that is separating the good from the bad.

The top blue line represents dispensing data from CVS. As you go down, the red bar, you can think of it as a sieve, is the methodology, the red flagging methodology that Mr. Catizone and Dr. McCann applied to the data. And in their mind, they have separated the wheat from the chaff, the unflagged versus the flagged.

To give you more context in terms of what Mr. Catizone has viewed or has regarded as flagged prescriptions, he has regarded them as not just warning signs, but also as not -- or I think he used the word "outside of the usual and customary." He also used the word that flags are more than likely to have been related to not for medical purpose or for diversion.

So these -- so what Mr. Catizone and Dr. McCann have attempted to do is going through the prescription data, applied the methodology and separate the flagged from the unflagged, the good from the bad, or the usual from the unusual.

Q Can you take a look at the next slide, Dr. Choi, and explain to the jury what this slide is to illustrate?

A So this illustrates the fact that the methodology that ultimately was applied did not properly separate the wheat from the chaff. It did not separate the usual from the unusual prescriptions. They applied a flawed methodology. And I think what I talked about before in terms of common sense approach of data analysis, it's common sense that you want to know what you're working with. You need to understand the context of the data before you start applying methodology.

So think of bookends. The first bookend is "Know what you're working with before you start applying your flags," flagging methodology, and the other end of the bookend is "You need to check your results." You need to check your results to ensure that it comports with common sense.

Mr. Catizone and Dr. McCann did not do either of those two ends of the data analysis, and in my conclusion they applied a very flawed methodology. And simply put, they did not separate the wheat from the chaff.

Q Would it be fair to characterize, just to use your metaphor here, that the wheat are the legitimate prescriptions that are going to go to -- excuse me -- go to patients in Lake and Trumbull County who have legitimate medical needs for those medications?

A That's correct.

Q And the chaff are the medications that are not written

for a legitimate medical purpose?

A That's correct.

Q And as I said, we'll get into this in more detail throughout your testimony, but your conclusion is that Dr. McCann and Mr. Catizone failed to actually separate the legitimate prescriptions from the illegitimate prescriptions?

MR. WEINBERGER: Objection, Your Honor.

THE COURT: Well, we'll go on the headphones a minute.

(At side bar at 1:47 p.m.)

THE COURT: All right. Mr. Bush, the problem is that isn't what they purported to do. So it's a little unfair to -- I mean, they never said that that's what they were doing.

MR. WEINBERGER: Yes, Your Honor, it completely mischaracterizes the testimony.

THE COURT: It does completely mischaracterize the testimony. Since he wasn't here, if you want to ask him is that's what he thinks they did in their reports, because he's read the reports, you can ask him what you think -- what he thinks they did, but I'm going to sustain the objection because it's not a --

MR. BUSH: Your Honor, I think he's already testified that he believes that they did characterize or

Mr. Catizone did characterize what he has separated out here are prescriptions that are more likely than not to be diverted, maybe even more strongly than that.

THE COURT: I'm going to sustain the objection to the question the way you asked it.

MR. WEINBERGER: Can you give a curative instruction, Your Honor?

THE COURT: I will.

(In open court at 1:48 p.m.)

THE COURT: The jury is to disregard that last question, please.

BY MR. BUSH:

Q So Dr. Choi, we'll come back to your opinions, but let's now talk a little bit about your background.

First of all, where do you live?

A I currently live in Lafayette, California, which is near San Francisco.

Q Do you have a family?

A I do. I've been married for 14 years. My wife, Christi, was a former elementary school teacher, and I have two sons, ages 13 and 10.

Q Have you ever been to Ohio?

A Yeah, several times.

Q Other than coming here today --

A Yes.

Q -- over the last couple days.

Do you have relatives here?

A I do. My sister-in-law lives in Mansfield.

Q And you've visited her on more than one occasion?

A Yes, more than one occasion.

Q And what does she do?

A She is a nurse.

Q Can you tell the jury what -- a little bit about your educational background, and let's start with college.

A Sure. So I actually -- I grew up in Riverside, California, and I went to undergrad there.

Q Where is Riverside?

A So Riverside, California, is about 60 miles east of Los Angeles. It's also known as the smog belt capital. So the reason -- the reason that's the case is that Los Angeles produces a lot of smog, and because of the air currents, it magically settles over Riverside, California.

And one of the saving graces of Riverside, California, is that it does have the University of California system there or school there, and that's where I went for my undergraduate degree. I received my undergraduate degree in 1993 in economics.

And then a year later I went to UC Santa Barbara. I received a master's degree in economics in 1994, with a --

(Court reporter interjection.)

So I received my undergraduate degree in 1993 in economics. I then received a master' degree in economics in 1994 from the University of California at Santa Barbara, with an emphasis in business and accounting.

From there I enrolled in the Ph.D. program at Duke University in the economics department. Along the way I received a second master's degree in economics, and ultimately my Ph.D. in 1999.

Q So after starting out with your education in California, how did you end up at Duke?

A Well, aside from Duke having a pretty good basketball team, Duke also had a very good applied economics program, and they also had a very well known health economics program, and it's one of the fields I wanted to study.

Q Can you tell the jury what the focus of your Ph.D. was on?

A My Ph.D. focus was in the area of healthcare economics, specifically involved medical malpractice and involved combining very large data sets into a malpractice claims data set. That was something I had to do on my own, along with creating a statistical model to analyze medical malpractice claims data.

Q Was your dissertation ultimately published?

A Yes, in a peer-reviewed economics journal.

Q After you graduated or maybe even while you were still

in school did you have any experience teaching college?

A I have. So when I was finishing up at Duke, I did teach undergraduate economics courses at Duke. Also, I did teach undergraduate economics classes at UCLA through their extension program, from 2008 to 2013.

Q So let's look now at your profession. And I see up here on the slide we have on the screen that you list as -- you list that you're the managing director of AlixPartners.

First of all, what's AlixPartners?

A So AlixPartners is a global consulting firm. We provide financial services consulting as well as management consulting. We have offices throughout the U.S., Europe, and Asia.

I'm proud to say that we consistently rank as one of the top consulting firms.

Q What's your position at Alix?

A I am currently a managing director, an equity partner. I'm also the partner in charge or the local market leader in our San Francisco office.

Q Did you recently step down from a position at AlixPartners, a management position there?

A Yes. So I founded the economics and statistics practices at AlixPartners. At one point I was the co-global lead of our economics practice.

Q Okay. How is -- and this is just a general question.

I'm not asking for a lot of detail about this, but generally speaking, can you tell the jury how AlixPartners is organized?

A Yes. So we have five distinct business units. I am part of our Financial Services Business Unit.

Q And then you have four other business units; is that right?

A That's correct.

Q Okay. Let's turn to a couple of general questions before we get to your opinions here.

First of all, in order to evaluate sets of data, in your experience, do you need to be an expert in the industry that the data relates to?

A So in my experience, you don't necessarily have to be an expert in the industry.

Q Why is that?

A Well, you have to familiarize yourself with the industry. You don't have to be an expert. Because it depends on the type of questions you're trying to answer, but also the methodology that you typically apply to large data sets is common throughout. And so you have to certainly ask questions, you certainly have to familiarize yourself, you certainly have to understand what you're working with, but you don't need the industry-level expertise in order to conduct the data analysis.

Q I want to talk again just briefly about some of the projects that you've had the opportunity to work on while you've been at AlixPartners.

Did you have the opportunity to work for any Government organization in connection with the analysis of largest sets of data?

A I have, yes.

Q Could you describe -- well, can you describe what you've done?

A Sure. So I assume many will remember the great financial crisis back in the late 2000s, around 2008. Part of that financial crisis, some would say, would be the questionable mortgages that were being issued at the time.

Based on the questionable mortgages, the Department of Justice launched an investigation of several of the largest financial institutions. They asked me to assist them with analyzing this voluminous mortgage loan data, to make sense of it, to provide insights from this data set. And ultimately these investigations led to the largest settlements in U.S. history.

Q Now, without identifying any clients or any specific projects, have you had the opportunity to consult on large data projects in other industries?

A Yes, several industries.

Q Can you give a couple of examples to the jury so that

they have some understanding of the kind of work you've done?

A Sure. So these involved healthcare, insurance companies, financial services companies, video game companies. One of my more interesting one was a brewery company.

So help assisting companies with understanding what's in their data, what the data set can tell them, to help them either in operations or understand how to compete more effectively in the marketplace.

Q And were you an industry expert in any of those industries, the brewery industry, the video game industry, insurance, any of those industries?

A Well, definitely not the video game industry. So again, some cases yes, some cases no. But the methodology that you apply is going to be consistent regardless of the industry.

Q Now, some of the engagements that you've had, including some of the ones that you've just described, have those been nonlitigation type engagements where you're simply consulting and trying to help whoever your client is understand what the data is telling them?

A That's correct, nonlitigation work.

Q And some of it -- you've also had some engagements where you have been engaged in connection with litigation?

A This -- yes, that's correct.

Q And some of the litigation engagements that you have been engaged in to be a testifying expert like you are here today?

A I have, yes.

Q And in others have you been engaged not to testify but just to help evaluate whatever the data may be and that's involved in that litigation?

A That's correct, yes.

Q Now, have you been -- have you actually testified in courts, both federal and state courts, as an expert in these areas?

A I have, yes.

Q Now, with respect to the work that you've done in this case, how are you being compensated?

You are being compensated, right?

A That's correct. So AlixPartners is being compensated for my time.

Q And what's the -- are you being compensated or is AlixPartners being compensated or paid for your specific time?

A Yes, that's correct.

Q And do you have other people who assist -- have assisted you in the work you've done in this case?

A I do have a team that assists me, yes.

Q And how are they billed?

A Hourly as well. So the hourly rate is between $210 and $970 for my staff and $970 for myself.

Q And does what AlixPartners get paid and what you are compensated depend in any way on the outcome of this case?

A It does not.

Q Are you doing work -- excuse me, withdrawn.

Have you done some work in connection with this case that does not involve matters that you are going to testify about today?

A I have, yes.

Q And has that been significant?

A It has been, yes.

Q All right. And how much has AlixPartners billed on this case?

A Approximately $2.6 million.

Q All right. Let's start to talk about your opinions. Before we get into the details of your opinions, are you -- have you reached the opinions that you're going to testify about here this afternoon to a reasonable degree of professional certainty?

A I have.

Q So anything -- any of the opinions you express today, will you agree with me you will express them to a reasonable degree of professional certainty?

A Yes, that's correct.

Q Now, so let's start at the beginning. I think you may have referred to this a little bit already, but when you start a data analytics project, can you explain to the jury what your objectives are? And I don't mean with respect to any particular client, just in general, what are your objectives?

A I think the first thing, one of the first things you want to do is understand what the potential problem is or what the questions are. Then the next steps are to -- you know, as I said before, this is common sense. You want to know what you're working with. You want to see what's in the data set. You also want to know what is not or what's missing from the data.

So you have to familiarize yourself with understanding what's in the data, what the data can tell you, what the data cannot tell you, and then you want to run some either algorithms or statistical analysis on the data set.

And again, on the back end it is imperative that you check your results; again, another common sense point, check your results to make sure that they make sense.

Q So in this matter or in this engagement, did you start by getting an understanding of what Mr. Catizone and Dr. McCann were trying to do with their red flag analysis?

A I did. And I started with reviewing their expert

reports that they produced in this case.

Q And can you describe for the jury what you understand they were trying to do?

And to be clear here, I think the jury knows this, but you haven't -- you were not present in the courtroom when Mr. McCann -- excuse me, Dr. McCann and Mr. Catizone testified, right?

A That's correct.

Q And you haven't read the transcript of their testimony here in the trial?

A I have not.

Q And so your understanding of what they did is based on your review of their expert reports?

A That's correct, and their testimony, their deposition testimony.

Q And their deposition testimony, okay.

So can you tell the jury what you understand from the review of their deposition testimony and their reports in this case what they were trying to do with the red flag analysis.

A Certainly. For CVS, I can start from there.

They had dispensing data with respect to the opioids at issue with, with muscle relaxers, benzodiazapine, I'm not sure if I said that correctly, and they had prescriptions -- or they had a data set of the prescriptions. They applied

what I called or referred to before after the red flag methodology.

So think again of the sieve. You're taking this data set, you're running it through the sieve, which is their methodology, and out comes prescriptions that are either flagged or unflagged.

Q All right. And the criteria here, was that 16 different criteria?

A There are 16 different flags, correct.

Q Let's take a look at the next slide.

Can you tell the jury what information you had available to you and considered in performing your analysis and reaching your conclusions and opinions in this case?

A Sure. So maybe I'll start from the bottom, since I covered this.

I did review the expert reports, accompanying documents that were produced by Mr. Catizone and Dr. McCann. I reviewed the documents produced by the parties.

As I mentioned before, Dr. McCann and Mr. Catizone have attempted to identify flagged or unflagged prescriptions using dispensing data.

This first dispensing data on top is the CVS dispensing data that I used and they used as well. It covers 14 years of data, from 2006 to 2019. It includes opioids, benzodiazapine, muscle relaxer medications at

issue. It also includes noncontrolled medications.

There's another data set that's referred to as OARRS. It's also listed here. It has a little bit more of a narrow time period, 2008 to 2018. It only covers the opioid, benzodiazapine, and muscle relaxers at issue.

But the difference between OARRS, one of the differences between OARRS and the CVS dispensing data is that OARRS covers all of the pharmacies for both Lake and Trumbull Counties.

Q Okay. Then I think on your -- the slide here, it also refers to documents that were produced by the parties.

Did you refer to those?

A Yes, that's correct.

Q Would it be accurate to characterize the CVS dispensing data as a large data set?

A It is a very large data set.

Q And would it be accurate to characterize the OARRS data as a large data set?

A Yes, that would be accurate.

Q So I think you've said already in general that one of the things you do as a data analyst is to understand the limitations of the data.

Did you review this data to understand the limitations that it had?

A I did.

Q And did you identify any limitations?

A There were several limitations, but a critical limitation is the fact that the dispensing data only has limited information. It doesn't have all of the information that a pharmacist would have at the time of a prescription. I can give you an example.

So a pharmacist could have a relationship or be very familiar with a particular patient. The pharmacist knows that the patient works in Cleveland but lives in Trumbull, so travels more than 25 miles, maybe 40 miles or 50 miles, to see a prescriber. The pharmacist could know that, but you would never know that from the data.

And limitations like that are common in this data set.

Q Was another limitation that the pharmacist may know or have information about a prescriber?

A Yes, that's correct. So a pharmacist could be familiar with the prescriber, but, again, that information would not be present in the data set.

Q And I don't mean to go through all the different kinds of information that might have been available to a pharmacist or might be available to a pharmacist, but are there other kinds of information that a pharmacist might have that are not in the data?

A There could be a number of different issues. As you can imagine, that there are all different types of issues or

circumstances that a patient would have. There could be a number of circumstances that a pharmacist would know about, but it just would not be available in the data, such as a pharmacist could know that a particular patient is battling cancer. That may not be known in the data set, and so without that information, it creates a problem. It creates what could be a large error rate if you're working with that data set, under the assumption that you believe that this data can tell you what the pharmacist was thinking at the time.

Q All right. Let's look a little bit at some of the analyses that you have done in the case using the data, keeping in mind the limitation that you just described. But you did do some work with the data itself, right?

A Yes, that's correct.

Q All right. And did you -- actually, let's just go to the next slide here.

This is data related to CVS pharmacies in Lake and Trumbull County, and you saw that's market share.

Can you tell the jury what is reflected on this screen, which is CVS-MDL-4352A?

A Sure. This represents the total number of opioid prescriptions from 2008 to 2018 that you see on the left. It identifies it by CVS and other entities, including other nondefendants. And to the right you have the total for both

counties.

Q Did you look at this and calculate or estimate what CVS's share of all of the opioid prescriptions dispensed in Lake and Trumbull County is?

A Sure. So that can be calculated. I didn't do the calculation on the chart, but that can be calculated here.

If you take the number at the very bottom, the 570,529.

Q Where I've got the pointer over?

A Right there.

Q Okay?

A And you divide that number by 3.5 million, it represents -- it calculates a 16 percent.

So CVS had 16 percent of the prescriptions for Lake and Trumbull County over this time period.

Q All right. And then you could do the same calculation for the percentage that other -- well, that other nondefendants have, which is the column right next to the total?

A Correct. So there are actually -- you see three columns of nondefendants, but if you're focusing just on the other nondefendant, which is the column furthest to the right next to the total.

Q Right here?

A That 881, if you take that divided by the total, is 25

percent. So the other nondefendants represent 25 percent of the prescriptions that were dispensed.

If you then add in let's say Rite Aid, Rite Aid is about 17 or 18 percent. If you add that to the 25 percent, you're at 43 percent.

So the last two columns -- I'm sorry, the second-to-last two columns, Rite Aid and nondefendants, that comes out to about 43 percent of the prescriptions.

And if you add Giant Eagle, that's another 16 percent. I'm sorry I'm throwing a lot of numbers at you. I apologize. But if you add Giant Eagle, that's another 16 percent.

So the three nondefendants account for almost 60 percent, six zero, 60 percent of the prescriptions over this time period.

Q All right. Did you also -- and the jury has heard actually a lot in this trial about MMEs. Did you also calculate the CVS market share measured by MMEs?

A I did, yes.

Q And let's take a look at this slide, which is Exhibit 4363A.

Does this reflect the analysis you did?

A It does. And so what we can see from this data is CVS -- I just compared CVS against all pharmacies.

And what it shows here, from 2008 to 2018, when

measured by MMEs, the market share falls from 16 percent to 12 percent.

Q All right. And what's your explanation for why the market share measured by MME would be smaller than the market share measured by prescriptions?

A Sure. So when you see a fall from 16 percent, as measured by prescriptions, and it falls to 12 percent by MMEs, what this is saying is that for CVS, relative to the rest of the market, its MMEs per prescriptions are generally lower.

Q And why is that significant to you?

A Well, MMEs are, again, one way of thinking about MMEs is that they measure potency or strength, and they're more likely -- the higher the MME, the higher the likelihood of diversion.

MR. WEINBERGER: Objection, Your Honor. There's -- can we go on the --

(At side bar at 2:12 p.m.)

MR. WEINBERGER: Your Honor, the reason for my objection is he's a data analyst. He has no knowledge about connection between the dose --

THE COURT: Yeah, I tend to agree.

MR. BUSH: Your Honor, can I be heard, please?

So as he's testified, I think, and he will continue to testify to this throughout his testimony, that although he's

not an industry expert when he is doing a project like this or the consulting projects that he has testified about, he learns things that he takes into account when he's figuring out what he wants to do in a data analysis.

So this is something he understands. Frankly, it's been testified to in the case.

THE COURT: I agree.

MR. BUSH: So it's not exactly controversial, but it's also relevant to what --

THE COURT: He made the chart. He can explain what MMEs are, I mean, so --

MR. BUSH: But he also needs to be able to explain why it's important to his data analysis. That's what he does as an expert.

MR. WEINBERGER: No, what he testified is the higher the likelihood of diversion. He is not an expert --

THE COURT: So he doesn't know, Mr. Bush -- he knows what an MME is. He can say you use MME so you can get -- you know, you can compare different prescriptions, it's a common denominator. I think he knows that and he put it on his chart.

MR. BUSH: Right.

THE COURT: But he doesn't know anything about which pills are more likely to be diverted.

MR. BUSH: Well, maybe that wasn't the best

way for him to frame what he does know, but he does know things about what -- anyway, I'm willing to move on.

MR. WEINBERGER: He doesn't have the expertise to connect --

THE COURT: All right, I'm just going to --

MR. WEINBERGER: -- dosage.

THE COURT: I'm just going to ask the jury to disregard the last answer.

(In open court at 2:14 p.m.)

THE COURT: The jury is to disregard the last answer by Dr. Choi. Thank you.

BY MR. BUSH:

Q So let me ask you to take a look at the next chart on the screen here, which is CVS-MDL-4967.

Do you see that?

A Yes.

Q And was this something that was prepared, a chart that was prepared under your direction?

A Yes, that's correct.

Q And does it reflect an analysis that you've done?

A Yes.

Q Okay. Can you explain to the jury what this is showing?

A So this measures across a number of stores. You can see a number of pharmacies on the bottom. CVS is to the

right with the number 375 in lighter shade of blue.

This represents median MME per prescription. And before I --

Q Explain to the jury, some of whom may have forgotten from their math class, what the difference is between median and mean?

A So median would be the middle point. So we have a number of lawyers in here. If you asked all the lawyers to stand from shortest to tallest, whoever is in that middle would be the median height.

For every pharmacy that I have represented here, I looked at the MME per prescription across the board, and whatever the middle prescription was is what's reflected here.

So for CVS you see 375 MME for the prescription, not per day but for the prescription.

If you look at to the left you see Anthony's and Champion Discount Pharmacy, the median MME is in excess of 1600.

So if you looked at all the prescriptions let's say for Champion, the median, the middle MME per prescription is 1600.

Q Let me direct your attention to the right-hand end of your chart here. And there's an entry for Target.

You see that?

A Yes.

Q And are you aware that at some point during the time period that's involved in this case that Target stores were acquired by CVS -- or that's not really the right way to put it -- that CVS began operating pharmacies in Target stores?

A Yes, that's correct.

Q And what time period does this Target line apply to? Prior to the CVS operating the pharmacies or afterwards, or both?

A It would be prior to.

Q Okay. Thank you.

All right. Let me ask you to look at some other data analyses that you've done.

Did you do an analysis that took into account DEA production quotas?

A I did, yes.

Q Okay. And does this chart that's Exhibit CVS-MDL-4328A reflect that analysis?

A Yes.

MR. WEINBERGER: Objection, Your Honor.

(At side bar at 2:17 p.m.)

THE COURT: All right. What's the objection?

MR. WEINBERGER: This is based upon his sources, DEA quotas, and when he went through what his reliance materials were, I didn't see that mentioned

anywhere in his reliance materials.

THE COURT: I assume this is in his report. You deposed him. I mean, if it's in his report, then he -- I mean, he can -- if it's in his report and he relied on DEA -- published DEA statistics, he can talk about it. I'm not sure what -- how he ties it to his conclusions, but --

MR. BUSH: He'll explain that, Your Honor.

THE COURT: All right. Well, overruled. You can ask him about it.

(In open court at 2:18 p.m.)

BY MR. BUSH:

Q Dr. Choi, can you explain again, just in general terms so the jury understands it, what a DEA production limit is?

A So the DEA for a given year sets manufacturing limits or caps for a particular chemical. What I have here on this graph is for oxycodone and hydrocodone from 2003 to 2018.

And so it's what the DEA has determined for legitimate purposes, and these are, again, their -- what the DEA has set for production limits or manufacturing limits.

Q All right. And did you do the calculation that's reflected on the next slide, which is CVS-MDL-4346A?

A I have, yes.

Q And what does that reflect?

A So this is the number of opioid prescriptions that were filled at CVS pharmacies from 2006 to 2019.

Q Did you compare this analysis to the previous analysis?

A Yes, a comparison can be done. And if you go back to the prior slide, I think one of the key takeaways from the DEA production limits is you can see from starting from 2003 all the way through 2013 for both hydrocodone and oxycodone, there is an increase. There is a positive increase, not every year, but generally a positive increase from 2003 to 2013.

For hydrocodone, not only is it at its peak in 2013, it stays at its peak all the way through 2015 before declining at a steeper rate.

For oxycodone, the peak is at 2013 with a gradual decline until 2015, then you start seeing a steeper decline.

But the key point is that there was a trend, an increasing trend over time.

As for comparison to the opioid prescriptions for CVS on the next slide, so you do see an increasing trend, but where there is a difference is starting in 2012 --

Q Just right where I put the pointer?

A Correct. That's where CVS was at its peak. So starting in 2013, the number of prescriptions for CVS starts to decline.

Now, without having to -- you can go back to the prior chart, but in 2013 for the production limits, it still

continued in 2013.

So what you're seeing is starting in 2013 a separation between what CVS is doing and what the DEA is setting in terms of its production limits.

So in 2013, it's going up for the DEA. Starting in 2013, this is going down for CVS. And then by the time you get to 2017, the number of prescriptions are actually lower than what they were in 2006, and then in 2019 much lower than what they were in 2006.

Q All right. Did you do an analysis of the percentage of prescriptions -- let me withdraw that and reframe it.

Did you do an analysis that compared noncontrols to controlled medications dispensed by CVS?

A I did, yes.

Q All right. Can we take a look at the next slide, which is CVS-MDL-4340.

And would you explain to the jury what's reflected on this -- on this table?

A Sure. So this is for Lake County. There are nine CVS stores. I broke it down between prescriptions and dosages, but as you can tell just by eyeballing it, that the percentages are similar whether you use prescriptions or dosage units. So I'll just stick with prescriptions.

So if you go in the middle here, I've broken it into two columns, controlled and noncontrolled. And what you're

seeing here is that across the nine stores for controlled, it is generally less than 14 percent. And then for noncontrolled, it is 86 percent or higher. In some cases, some stores, the controlled actually represents less than 10 percent, and the noncontrolled represents more than 90 percent.

So one of the takeaways that you see here is that the vast majority of the prescriptions for CVS are for noncontrolled drugs.

Q Do you have an understanding of what medications are included in the controlled category?

A Yeah, so those are the medications covered under the Controlled Substance Act, so they would include opioids, benzodiazapine, ADHD medications would be included. For noncontrolled, it would be for high blood pressure, diabetes, high cholesterol type medications.

Q So controls include opioids but also things other than opioids?

A That's correct. So if you only focus on opioids, these percentages you see under the controlled would actually be lower.

Q We'll look at that in a second, but let's go to the next slide.

Does this reflect a similar analysis in Trumbull County?

A That's correct. So what you're seeing with Trumbull is similar. I won't go into all the detail, but I think the takeaways are the same.

Here 15 percent are lower for controlled. Opioids are a subset of the controlled, so they would be lower. And the vast majority of the prescriptions by the CVS stores in Trumbull are for noncontrolled drugs.

Q If I ask you to assume that the DEA has indicated a percentage of controlled dispensing less than 20 percent is that threshold -- below that threshold, is something that they don't believe is a matter of concern; and I'm asking you to assume it --

MR. LANIER: And Your Honor, I'll object to it already.

MR. BUSH: Let me finish, please.

THE COURT: Let me hear the question.

Q If I ask you to assume that, is that something that in your role as a data analyst you would find significant in looking at these figures that you just testified about?

MR. LANIER: Objection.

THE COURT: I'll sustain that.

MR. BUSH: Your Honor, could we go to the headphones, please?

THE COURT: All right.

(At side bar at 2:24 p.m.)

MR. BUSH: I asked to him to assume it obviously because he's an expert. And I think, Your Honor, maybe I haven't done a good job of bringing out what he does, but as a data analyst, he gets information, I tried to establish this up front, from other sources that he may not have direct knowledge about, but it helps him -- it helps him -- it helps put in perspective what his analysis is and what kinds of conclusions he thinks can be drawn from the date.

This is actually a fundamental, I don't mean this particular point, but this kind of perspective is kind of a fundamental part of his opinion. He's saying when you look at data sets, you learn information from your client, you learn information from other people, and when you look at the data, it helps you determine what you can find out from it.

THE COURT: Mr. Bush, you don't need an expert; obviously 8 percent, 12 percent, is less than 20 percent.

MR. BUSH: Right, but the 20 percent isn't in. If I don't ask him to assume it, he can't draw the conclusion for the jury.

THE COURT: He can't draw any conclusion because he doesn't have the expertise. He can draw a conclusion that 12 percent is less than 20 percent, but the

jury knows that.

MR. LANIER: And that's the key, Your Honor, because the testimony from Rannazzisi on this was not that 20 -- less than 20 percent is safe. It was that less than 20 percent doesn't trigger the DEA's knowledge.

So for Mr. Bush to take this a step further and argue that this is a hypothetical where the DEA says it's safe, that's just wrong, and this man doesn't have the expertise.

THE COURT: He doesn't have the expertise to say what the 20 percent signified. Obviously, 12 percent's less than 20 percent. Anyone can see that and you can argue that.

MR. BUSH: Right, but, Your Honor, my point is I asked him to assume it. It's not his expertise to say that 20 percent is the right number. It is his expertise to say that if I knew that 20 percent was the right number, that would be relevant to how I look at this data.

That's what he's testifying to. I asked him to assume it.

THE COURT: But he doesn't know what the 20 percent is, and I think even that was skewed.

MR. LANIER: And that's my objection. Thank you.

THE COURT: I'm going to sustain the objection.

(In open court at 2:27 p.m.)

MR. BUSH: Your Honor, I'm sorry, let me go to the headphones again because I don't want to violate your rule.

THE COURT: All right.

(At side bar at 2:27 p.m.)

MR. BUSH: I was going to ask him the question the way Mr. Lanier asked it, that if he assumes that 20 percent is below a level that -- if it's below 20 percent, it's below a level that causes the DEA concern. If that's acceptable to him, I'll ask it as an assumption.

MR. LANIER: That's not it either.

THE COURT: But then what is the question?

MR. BUSH: The question is if he -- if he assumes that that is what the DEA considers something that's not a concern, would that have informed his evaluation of the data, how he looks at it.

THE COURT: Wait, hold it. The numbers are the numbers. He didn't evaluate the data. I mean, he did the math. He crunched the numbers, and this is what he got, and it shows what it shows.

MR. BUSH: He did more than that because he is going to testify that this perspective helps him evaluate whether the ultimate decisions that Catizone and McCann made really make sense. This is big picture perspective for

whether they make sense.

MS. FUMERTON: Your Honor, if I may jump in for a second just because --

MR. LANIER: This isn't your witness.

MS. FUMERTON: This issue is going to come up. There is a witness, DEA witness, who testified in this case about the 20 percent figure. To the extent the experts relied on that testimony, I think that they are entitled to be able to mention that --

THE COURT: Hold it. But this witness is not opining. He has no expertise to talk about what the DEA does or doesn't do.

MS. FUMERTON: Your Honor --

THE COURT: The math is the math, all right? He analyzed the prescriptions. You got it.

MS. FUMERTON: But it's exactly similar to how Dr. McCann applied Catizone's red flags. Dr. McCann didn't have the expertise to identify what is now in this red flag, but he took the assumption of, you know, what is a red flag, and he applied it to the data and said this is what they get.

MR. WEINBERGER: No, that is not true.

THE COURT: All right. It doesn't equate. I am not going to let -- Mr. Bush, you're asking him to draw some conclusions for the DEA about -- from this data. He

can't do that, or opine on whether this is what the DEA meant when they set the 20 percent target. He doesn't even know that they set a 20 percent target.

MR. BUSH: Actually, I'm not asking him to opine on what the DEA said. I'm asking him to assume what the DEA said and whether that would inform his evaluation of this data.

THE COURT: What do you mean "inform the evaluation of this data"?

MR. BUSH: He is evaluating whether this data, he does these calculations and then he looks at what McCann --

THE COURT: He doesn't have knowledge of this industry. He doesn't know what this signifies.

MR. BUSH: As you know, Your Honor, because you heard his testimony, he can form opinions as a data analyst without being an expert in the industry. He learns information from whatever industry he is engaged by clients to do his work in.

MR. WEINBERGER: Frankly he cannot testify to any opinions with respect to Catizone's analysis either because he's not a red flag expert. I mean, he can talk about whether he agrees or disagrees with McCann's analysis of the data.

THE COURT: Right, he can -- exactly. He

can't say whether he thinks McCann's 16 red flags overstate things and it should be 10 or 11, or should be 20.

MR. BUSH: He certainly can, Your Honor. And it's been in his report, and the plaintiffs did not file a *Daubert* motion on it. And for them to bring it up now is just out of bounds.

THE COURT: I'm sustaining the objection to this question. I'm not saying there's not any question you can't ask him more on this chart, but he has --

MR. BUSH: So the question that -- I came back down here because I wanted not to, you know, step over the line.

THE COURT: All right.

MR. BUSH: And just to be clear, the question I was going to ask was, to adopt Mr. Lanier's version of this is, "Was 20 percent below what the DEA finds a matter of concern."

MR. LANIER: And that is not my opinion. That is not right. He can just do the math. Let him bring in a DEA person to say 20 percent and draw those conclusions.

This guy is a data analyst. This is why we had to put on Carmen Catizone and not just McCann. You've got to have someone qualified and competent. You're the gatekeeper. I don't have to file a *Daubert* motion on this.

MR. BUSH: Of course you do. He has put it in

a report, and he has said this is how I do it in my profession. I look at data, I learn what I need to know when I look at the data to be able to help my clients understand what the data really can tell them.

And Catizone has put up some red flags, but whether those really tell anybody very much about anything is something he is qualified to testify about. And it's in his opinion, it's in his report.

THE COURT: I'm not sure. I'm not sure he is. I haven't heard any such testimony.

He's basically a statistician, all right, he crunches numbers. And he can certainly say that someone else's methodology is flawed because it's under-inclusive or over-inclusive, and that was the wheat versus chaff. He's absolutely qualified for that. But he can't say, well, you know, 12 percent is safe and 20 percent's not.

MR. BUSH: No, he is not saying whether it's safe or not.

THE COURT: Well, what exactly is he going to say?

MR. BUSH: Right now he's not saying anything about that. We're just at the very preliminary stage. But this is all information that if you were looking at the data from his perspective as the data analyst you would want to know about to evaluate whether the methodology that McCann

and Catizone have come up with is reliable. But this is just background.

THE COURT: Hold it. There is absolutely nothing about that DEA 20 percent that's necessary to determine if McCann and Catizone are reliable or not.

So, I'm sustaining the objection to the question you asked.

MR. BUSH: All right. Thank you, Your Honor.

(In open court at 2:33 p.m.)

BY MR. BUSH:

Q Let me figure out exactly where we are here, Dr. Choi.

So I think this is just a little bit of housekeeping, but if I ask you what's reflected on CVS-MDL-4339, can you tell the jury what that is?

A Sure. This is a summary of the prior two slides. You can see at the very bottom here Lake and Trumbull County, the number is 12.7 percent and 87.3 percent. That is the percentage of controlled versus noncontrolled across the two counties over that time frame.

And again, what this represents is that the vast majority of the prescriptions for CVS is mostly for noncontrolled or is 87.3 percent for noncontrolled.

Q All right. Let me ask you to take a look at the next slide, which is CVS-MDL-4342A.

Do you see that?

A Yes.

Q All right. And is this -- this is a slide that was prepared by you or under your direction?

A Correct.

Q And can you tell the jury what is -- what this lower bar on the left with the number 701,467 represents?

A Sure. That represents the number of prescriptions for the opioid medications.

So as I said before, in the prior slides you saw for controlled prescriptions, opioid prescriptions would be a subset of that, would be a smaller percent, and that's what's reflected here.

And so for a point of comparison between the noncontrolled and the opioid medications, that blue bar on the right to the noncontrolled is about 18 times larger than the opioid medications just in the number of prescriptions.

Q All right. What is reflected on this slide, which is CVS-MDL-4335A?

And actually before I ask you what's reflected on it, is this a chart that was prepared by you or under your direction or at your direction?

A Yes.

Q Okay. Can you describe what's on this chart?

A So for Lake and Trumbull Counties, this is simply the number of prescriptions for noncontrolled over time. And

one of the takeaways that you can see from 2006 to 2019 is an increase in the number of noncontrolled prescriptions for the two counties, again peaking in 2018.

So starting in 2006, about 800,000, peaks near 1.2 million by 2018. So it's an increasing trend across the two counties over that time period.

Q All right. Let's take a look at the next slide, CVS-MDL-4346A.

Was that prepared by you or at your direction?

A That's correct.

Q And what does that reflect?

A This is a -- I presented this previously. This is the opioid prescriptions over time from 2006 to 2019. Again, one of the takeaways is that starting in 2013 you start to see a decline. So comparing that to noncontrolled, where you start to see -- where you continued to see an increase, for opioid prescriptions you are starting to see a decline in 2013, and it gets steeper and steeper all the way through 2019.

Q And does this slide, which is CVS-MDL-4968, combine the two previous slides?

A It does.

Q And what's your takeaway from comparing these two lines, the opioid prescriptions to noncontrolled medications in the --

MR. WEINBERGER: Objection.

MR. BUSH: Sorry?

MR. WEINBERGER: Objection.

THE COURT: I'm going to sustain that.

Q Do you have a conclusion from looking at these two lines together?

A There are two -- at least two conclusions you can draw from looking at the two lines together from a data standpoint. One is that --

MR. WEINBERGER: Objection, Your Honor.

THE COURT: If he's looking at the data and looking at the statistics, he can testify to that. I don't know what you're going to say though.

THE WITNESS: I was going to simply say, one issue is scale. So the green line, which represents noncontrolled, is substantially larger, and the other one is trend. So the green line continues to go up over time, up until 2018, whereas the blue line, which is the opioid prescriptions, as you saw in the prior charts, did go up, but then in 2013 started to decline.

So again, the separation in trend between noncontrolled and opioid prescriptions.

Q All right. Thank you, Dr. Choi.

Can we look at this next slide? This is CVS-MDL-4337A.

Was this table prepared by you or at your direction?
A Yes, it was.
Q And can you explain to the jury what you are illustrating with this slide?
A So I can focus you on the bottom, which is the per capita calculation. And the way that's calculated is taking into account the annual number of noncontrolled, in this case dosage units, take the average amount over those -- over that period, divide it by the population for both counties, about 440,000, to get to a per capita number, or per person number.

And that means that the 132 that you see at the very bottom, that's 132 dosage units per person for Lake and Trumbull County, for noncontrolled prescriptions.
Q All right. And then you have this line, Dr. McCann's annual oxycodone and hydrocodone DU -- is that dosage unit?
A Yes.
Q -- per capita?
A Correct.
Q And what's that number?
A That number was calculated by Dr. McCann. And this is a comparison between for noncontrolled against the oxycodone and hydrocodone per capita that was calculated by Dr. McCann.
Q All right. Let's move on to -- well, actually,

let's -- can you summarize what the analyses that you've just testified about are showing?

A Sure. So I may need to refer back to what I said before about appropriate data analysis.

And again, understanding for in this case the dispensing data, what information is actually in the data to help you think about other -- when you apply let's say rules or algorithms to it to provide perspective.

And so what we saw from the dispensing data at CVS and OARRS is CVS accounts for about 12 percent of the MMEs across the two counties. Other pharmacies account for a much larger percentage in aggregate.

As we saw, CVS in terms of trend, the opioid medications were starting to decline starting in 2013, breaking away in terms of trend from the DEA production limits and also noncontrolled prescriptions.

And the other thing that we saw when I did the comparison between controlled versus noncontrolled, the vast majority of the prescriptions are for noncontrolled.

Q All right. Thank you.

Let's move on to Mr. Catizone's and Dr. McCann's red flags.

And before we get started, do you have an opinion whether Mr. Catizone and Mr. McCann have validated the red flag methodology that's used for identifying prescriptions

that may not have been written for a legitimate medical purpose or may be diverted?

MR. WEINBERGER: Objection, Your Honor.

THE COURT: Let's go on the headphones again.

(At side bar at 2:42 p.m.)

THE COURT: Mr. Bush, I don't understand the question. And I don't -- I don't believe this witness has the expertise to say what should or shouldn't be a red flag. So if that's the question that you're asking, I'll sustain it. But I don't understand the question, but if that's it, then I'm sustaining it.

MR. BUSH: That's not the question, Your Honor.

THE COURT: What is it?

MR. BUSH: There's a methodology that's been used in the case that's been developed in combination by Mr. Catizone and Dr. McCann to quantify the number of prescriptions that were, you know, call them red flags, should have been investigated, should have had due diligence, and should have had documentation. And what Mr. -- what Dr. Choi is testifying about is whether that methodology is valid from a data perspective. Can you take -- assuming Mr. Catizone's red flags are correct, can you take them and really identify that from the data.

Mr. Catizone --

THE COURT: Then this is how you've got to do it. You have to ask him do you know what methodology McCann and Catizone used, what was it. So what was it and do you have an opinion based on your expertise whether that methodology was valid. And if he says no, then you can ask him to explain why he thinks their methodology's faulty.

MR. BUSH: All right. That's fine, Your Honor.

(In open court at 2:44 p.m.)

MR. BUSH: One second, Your Honor.

Q So Dr. Choi, let's start with the question of whether or not you have examined -- actually, let's start even before that.

Have you taken steps to understand the methodology that Dr. McCann and Mr. Catizone used in order to quantify the red flags that they believe they found in the data representing prescriptions that were potentially illegitimate or would potentially be diverted?

A I understand the methodology.

Q All right. And have you -- do you have an opinion on whether that methodology was valid and reliable to accomplish that?

A In my opinion, the methodology from a data analysis standpoint was flawed. I believe that it's not -- doesn't yield a reliable conclusion regarding what -- you know, my

analogy or metaphor of separating the wheat from the chaff, it does not provide a reliable conclusion in properly separating these prescriptions.

Q So I want to ask you, in general before we get into some other parts of your testimony, what the bases for that conclusion.

Is one of the bases -- let me ask it this way.

As you reviewed the reports of Dr. McCann and Mr. Catizone, did you see anything in those reports that suggested they had done anything to try and validate the methodology that they used?

A I did not see anything in their documentation where there was validation.

Q All right. And did you see anything in their reports that indicated to you that they had taken into account what you testified to earlier, that there is information that would be relevant to this decision that a pharmacist might make that isn't in the data?

MR. WEINBERGER: Objection.

THE COURT: Sustained.

Q Did you take into account in reaching this opinion that there was information that was not in the data and that was a limitation of the data set?

MR. WEINBERGER: Objection.

THE COURT: Let's --

(At side bar at 2:47 p.m.)

THE COURT: Mr. Bush, you got out that he has an opinion that it was wrong, that it doesn't separate the wheat from the chaff. Why don't you ask him to explain that conclusion?

MR. BUSH: Why wouldn't an expert explain the opinion? That's what experts do all the time.

THE COURT: That's what I'm saying, why don't you ask him to explain his conclusions.

MR. BUSH: So you don't want me to be leading him? If that's the objection, I can deal with that. I just don't know if that's the objection.

THE COURT: I just don't understand -- I don't understand a lot of these questions. He's given his opinion. He says "I believe that the methodology they used was flawed. It doesn't adequately separate the wheat from the chaff."

Just let him explain his conclusion and how he got to it. That's fine, I'll let him do that.

MR. BUSH: Okay. That's fine.

(In open court at 2:47 p.m.)

BY MR. BUSH:

Q Can you explain for the jury what some of the other bases are for the opinion that you've already expressed that the methodology was not valid or reliable?

A Sure. So maybe referring back to what I talked about before in terms of what I believe are appropriate data analysis methodologies but also fits with common sense: Understand what the limitations of the data are, understand what the data can tell you; then you can apply your algorithms or statistical methods on top of that, and then on the back end check the results, check to see if they make sense. These are, again, very common sense things that you don't have to be a data scientist to even understand that.

What was lacking in Mr. Catizone and Dr. McCann's methodology is even on the back end, I didn't see anything in the documentation where they checked to see if their results made sense, whether they validated the results that they got.

On the front end, what the information is, what are you working with, I did not see in the documentation that they fully appreciated the limitations of this data.

Now, there is some language that Mr. Catizone said that he recognizes that the data doesn't capture what the pharmacist is actually seeing. But rather than addressing that, rather than looking into that, it was just acknowledged and then they just went through with the red flag methodology.

That is not reliable methodology to analyze data.

MR. WEINBERGER: Objection. Move to strike.

THE COURT: Overruled.

Q So Dr. Choi, did you have -- did you take the opportunity to evaluate from the data some of the red flags that this methodology produced, or produced numbers for, I guess is the way to put it?

A I have, yes.

Q All right. So let's -- let me ask you to take a look at the -- hold on a second.

MR. BUSH: Excuse me, Your Honor.

Q Is this -- are these pie charts, were these pie charts prepared at your direction or by you?

A Yes.

Q Okay. And was this one of the analyses that you performed to evaluate the flags, the number of flags, and for each of the flags that were calculated by Dr. McCann based on Mr. Catizone's description of the red flags?

A Yes, they are.

Q And can you tell us or tell the jury what these three pie charts represent?

A Sure. This is three separate ways of looking at the results from Mr. Catizone and Dr. McCann's methodology.

So on the left, just in the number of prescriptions, if you apply the -- again, the Catizone McCann methodology to the prescriptions, you will see that 21 percent get flagged. That's one in five opioid prescriptions or --

again, if you include benzodiazapine and muscle relaxers, but one in five prescriptions get flagged.

If you can look at it from a prescriber basis, 37 percent of the prescribers are flagged. That's more than one in three prescribers are getting flagged.

And let me remind you as to how Mr. Catizone in his report has described the flagged: Not just a warning sign, outside of the usual and customary, more than likely or likely to be diverted or fraud, or be abused.

So he is essentially saying from his results, more than one in three prescribers are writing prescriptions that have that characteristic.

MR. WEINBERGER: Objection. Move to strike. Mischaracterization of --

THE COURT: Hold it, hold it.

Yeah, let's go on the headphones again.

(At side bar at 2:52 p.m.)

THE COURT: The problem is I don't think that Catizone said this, that the -- that there was more than a warning sign, outside of the usual and customary, more than likely, or likely to be diverted, be fraud, or be abused.

He said there were red flags that needed to be looked at before filling. That's what his definition of a red flag was. So the problem is the way this witness mischaracterized Catizone.

Again, if he -- what he said at first is fine. He can testify that he sees problems on the front end and problems on the back end from the way they used the data. That's what he -- that's what his expertise is, is data analysis, and he can explain why he thinks there were problems on the front end and the back end. But here he's mischaracterizing what they did, and he has no idea and no expertise as to what pharmacists do or don't do.

MR. BUSH: All right, Your Honor.

(In open court at 2:54 p.m.)

THE COURT: The jury is to disregard the last answer, please.

BY MR. BUSH:

Q So did you become aware as you were performing your analysis of statements by the DEA with regard to the number of prescribers who were acting legitimately?

MR. WEINBERGER: Objection.

MR. BUSH: I just asked whether he became aware.

THE COURT: Well, he can ask the question.

Q Did you?

A Yes, I'm aware.

Q All right. And was that information that you had when you were evaluating some of the -- well, in particular, the calculation about the number of prescribers?

MR. WEINBERGER: Objection.

A Yes.

THE COURT: Overruled.

Q And can you explain to the jury why what you understood and what you learned was relevant to your analysis of the number of prescribers that flagged?

A Sure. So --

THE COURT: Wait.

THE WITNESS: Sorry.

THE COURT: Let's go --

(At side bar at 2:56 p.m.)

THE COURT: All right, Mr. Bush, I'm not trying to give you a hard time, but we're not just communicating well.

I don't understand what you're trying to do with this witness. He's put something on here, and I think you can bring out from him that this thing's so large and there was no checking on the back end. I thought that's where you were going to.

I don't understand what -- you know, is the DEA -- I mean, has the DEA published statistics about, you know, what percentage of prescriptions are questionable? I mean, I don't understand this.

MR. BUSH: We've had testimony from Mr. Rannazzisi that the overwhelming number of -- the

overwhelming number of prescribers are trying to do the right thing, or words to that effect.

There's going to be a slide that I haven't put up yet that has a DEA acting administrator saying that 99.99 percent of the prescribers are doing the right thing.

And from the front end -- this has a front end and a back end. From the front end, if you're looking at a data analysis and you flag 37 percent of the doctors when somebody who's in an authoritative position administering the Controlled Substance Act and enforcing it says that only .01 percent of prescribers are bad, this would cause you to think maybe this data analysis ain't so great.

So this is relevant to his data analysis and it's something he would have done for any client.

MR. WEINBERGER: But he's not qualified --

THE COURT: Well --

MR. WEINBERGER: I mean, he can say it seems like a high percentage or not, but he can't say --

THE COURT: Right, he can -- if he has read what the DEA --

MR. BUSH: He has.

THE COURT: 99.99? I don't recall testimony in the case that .001 -- that 99.99 percent of prescribers are good.

MR. BUSH: There's a whole variety of them in

there. They're all over the place. That's one of them though, Your Honor.

And whether he -- honestly, whether it's in evidence or not in some sense isn't the most relevant factor. As a data analyst, he would get that kind of information and it would inform how he looks at the data, then it's relevant to his expert opinion.

THE COURT: If you want to say that he would bring out that he's aware that the DEA's concluded that the overwhelming percentage of prescribers are good doctors, fine, you can get that in.

If he's saying that's why a methodology that flags 37 percent of the prescribers, they should have looked at it at the front end or the back end, okay, he can say that, if that's what he's saying.

MR. WEINBERGER: But that has nothing to do with the red flag analysis, Your Honor.

THE COURT: Well, but it does if the analysis kicks out -- if this is accurate, and he said he's crunched the numbers, and McCann's red flag analysis flags 37 percent of the prescribers in Lake and Trumbull County.

MR. BUSH: Prescribers of opioids, to be clear, but yes.

THE COURT: Prescribers of opioids, right. Obviously we're only dealing with the subset that have DEA

registration. It flags 37 percent of them, then that's a --

MR. WEINBERGER: So we know where he's going with this, Your Honor, because the next --

THE COURT: I'll allow that, I'll allow that.

MR. WEINBERGER: But Your Honor, the next slide which he's going to show this witness is a statement from the DEA that says, "I look at the vast majority of doctors. 99.99 percent are all trying to do right by their patients."

That has nothing to do with whether or not that kind of percentage, less or more, would trigger a red flag.

MR. BUSH: I don't know how Mr. Weinberger can say that has nothing to do with it.

THE COURT: I think it's relevant when if in fact 37 percent of the prescribers were flagged. That's been the defendants' -- one of the defendants' arguments, Mr. Weinberger, is that the red flag analysis was virtually overinclusive, it was unworkable and unmanageable, and it flagged a whole lot of things that shouldn't have been flagged.

That's their argument.

MR. BUSH: That's right, Your Honor.

THE COURT: They're allowed to make that argument, and this ties in with that. So we can -- with some limitations, I mean, he did this data, and he can say

that that's why he thinks that McCann and Catizone should have looked at this and tried to reconcile it. That's his point.

MR. BUSH: So, Your Honor, just out of the interest of not having to keep getting up and down, Mr. Weinberger is correct that there is a quote from a DEA acting administrator that Dr. Choi has looked at and he's relied on. He knows of other things too, but I don't want to have to just get up and get back down if you don't want me to show him that. If you don't want me to show him that, I won't.

THE COURT: If he took that into account in concluding that Catizone and McCann's data analysis was flawed, he can say that's one of the things I took into account, and they should have at least tried to reconcile it.

MR. BUSH: Thank you, Your Honor.

(In open court at 3:01 p.m.)

BY MR. BUSH:

Q Dr. Choi, are you aware of statements by DEA officials with regard to the number of doctors, prescribers in general, who are trying to do the right thing?

A I am.

Q Okay. And let me ask you to take a look at this.

Is this one example of statements that you're aware of

from DEA officials on that subject?

And I'll read it. It says, "I look at the vast majority of doctors. 99.99 percent are all trying to do right by their patients."

A Yes, this is an example.

Q And this was -- this statement was made by whom?

A Mr. Robert Patterson, acting administrator of DEA.

Q And going back to your previous slide where you've calculated that Mr. Catizone's and Dr. McCann's red flag methodology flags 37 percent of the prescribers of opioids in Lake and Trumbull County -- and this is over a 14-year period; is that right?

A That's correct, yes.

Q Did that cause you to question whether the methodology is reliable?

A The two don't reconcile. So you have on one hand the statement that the vast majority of doctors are trying to do right by their patients, but then you see the flagging results from Mr. Catizone and Dr. McCann's methodology that is flagging more than one in three prescribers. So the numbers are not reconciling.

MR. BUSH: So, Your Honor, I see we're at 3:00. I'm happy to keep going for a while.

THE COURT: I was going to ask you -- I didn't want to cut you right off. I know you were on those charts,

so you tell me when it's a good time, Mr. Bush.

MR. BUSH: We're not going to get done in the next ten minutes.

THE COURT: If this is a good time, that's fine. I didn't want to cut you off in midstream.

MR. BUSH: Thank you.

THE COURT: Ladies and gentlemen, we'll take our mid afternoon recess, 15 minutes. Usual admonitions. And we'll pick up with Dr. Choi. Thank you.

(Recess taken at 3:04 p.m.)

(Jury present in open court at 3:22 p.m.)

THE COURT: Okay, please be seated, ladies and gentlemen.

Doctor, you are still under oath from before the break.

And Mr. Bush, you may continue, please.

MR. BUSH: May I proceed, Your Honor?

THE COURT: Yes.

BY MR. BUSH:

Q Dr. Choi, just take a look at the screen here for a second, at the middle chart, the prescribers pie chart.

A Sure.

MR. BUSH: And then, Mr. Pitts, could I have the ELMO for a second?

Q So I've put up on the ELMO CVS-MDL-4343A, and it's

really just a quick question.

Is that the pie chart that was reflected in the middle of the prior slide?

A That's correct.

Q And you prepared that or at your direction?

A I did, yes.

MR. BUSH: If I could go back to the slide show, please, Mr. Pitts.

Q Did you do a calculation of the percentage of opioid prescriptions flagged by plaintiffs' experts for patients who reside in Lake and Trumbull Counties?

A I did, and that's reflected here.

Q That's reflected on what's up on the screen, which is CVS-MDL-4966?

A Yes.

Q Okay. And what does it show?

A So we can start on the left. These are all the opioid prescriptions that were flagged under the -- Mr. Catizone and Dr. McCann's methodology.

So for Lake, what it's showing here is that for the prescriptions that were dispensed at CVS's Lake locations, 86 percent of the prescriptions were related to a patient who resided within Lake County.

To the right on Trumbull, for the Trumbull table, the percentage is actually higher. So 93 percent of the

prescriptions that were dispensed in Trumbull County went to individuals or patients who resided in Trumbull County.

Q Now, just to be clear, because I don't want there to be any confusion, this is 90 or -- the percentages for each one respectively, the flagged prescriptions that went to patients in either of those two counties. It's not the number of patients in those two counties who had flags?

A That's correct.

Q Okay. Did you do a calculation or an examination of the red flag results of Mr. Catizone and Dr. McCann to look at what might be called normal patient behavior?

A I did, yes.

Q All right. Let's take a look at the next slide here. This is CVS-MDL-3882A.

Do you see that?

A I do.

Q Okay. And this looks like this is the red flag that flags prescriptions where the distance between the patient and the pharmacy is more than 25 miles; is that right?

A That's correct.

Q Okay. And can you explain to the jury what this chart -- what you've done on this chart?

A Sure. So red flag 1, under Mr. Catizone's flagging methodology, is whether a patient traveled more than 25 miles to a pharmacy. And so if a patient went more than 25

miles, there would be a flag.

What I did here is examined not just for opioids, but also for noncontrolled medications --

Q So that's over here in the right column, noncontrolled's?

A That's correct. So if it's viewed that this is a particular behavior, so again, driving a long distance would be considered a behavioral flag, if the behavior was specific to opioids, then you would see that behavior different from a noncontrolled medication.

But what you're seeing here is that the vast majority of the patients travel, in this case the 97.4 percent on the left travel less than 25 miles to the pharmacy. And if you look all the way to the right, and apologies for bouncing back and forth, but you see 97.8 percent.

What you're seeing here is no difference in the numbers between behavior for opioids in terms of traveling, 25 miles to a pharmacy, versus noncontrolled. They're similar behaviors. So this is not something that from a data standpoint you would say this flag is measuring an aberrational behavior.

Q So just to put this maybe in, you know, plain old English, this is the percentage of people who travel more than 25 miles to get regular old medications, noncontrolled medications, filled is about the same as the percentage that

travel more than 25 miles to get opioid prescriptions filled?

A That's correct.

Q And did you do a similar calculation for the red flag that flags prescriptions where the distance between the patient and the prescriber is more than 25 miles?

A I did, and that's reflected here.

Q First of all, is that reflected on this exhibit which is CVS-MDL-3887A?

A It is, yes.

Q And you prepared that under -- or under your direction it was prepared?

A I did, yes.

Q Okay. Can you explain to the jury what that shows?

A Sure. Red flag 2 is another behavioral flag, and that's the distance between the patient and the prescriber. And if it's more than 25 miles, the flag is tagged for that particular prescription.

So it's the same concept. Is there a difference in behavior, do you see a difference in behavior between the opioid prescriptions and the noncontrolled medications on the right.

So you see for opioids it's 86.4 percent actually go less than 25 miles, for noncontrolled it's 89.8 percent. So there's a little bit of a difference, but it's not a

material difference.

And the conclusion you can reach from the data standpoint is that there's no difference between opioids and noncontrolled medications when you're talking about this particular behavior.

Q All right. Did you do a similar calculation for prescriptions that were flagged by Mr. Catizone and Dr. McCann's cash red flag? That's red flag 16.

A I did, yes.

Q And is that reflected on this exhibit which is CVS-MDL-3896A?

A It is, yes.

Q And can you explain this one?

A Sure. So this is another flag, and this is where the cash was paid. Dr. McCann applied red flag 16 to the data and identified it as a flag if the cash was paid or there was a cash discount.

Simply put, if you compare the numbers of what you see on the opioids column, 4 1/2 percent, 2.4 percent, and you compare it against the noncontrolled medications of 3.2 and 1.9, yeah, there are some differences, like a percentage point here or half a percentage point there, but it's not a material difference.

So for individuals who paid cash for the opioids, you are not seeing what you would say is a behavior that's

distinctive for opioids as opposed to when you compare it with the noncontrolled medications.

Q Do you recall how Mr. Catizone described the cash red flag in his report?

A I do, yes.

Q Can you tell the jury how he described it?

A In his report, he described the cash when the patient has insurance. So a cash payment with insurance would warrant a red flag. That's the way it was written in his report.

Q Does this red flag calculation that he and Dr. McCann did capture only people -- or prescriptions that were paid for in cash when the patient had insurance?

A So this calculation you see here, as I said, was done by Dr. McCann. There's no -- there's no reflection of insurance. There's no counting of insurance. It's just whether a cash payment was made.

Q Did you do a -- did you evaluate the data to see how many flagged prescriptions were for prescriptions written by prescribers in Cleveland?

A I did, yes.

Q And is that reflected on CVS-MDL-3886A?

A Yes, it is.

Q Okay. Can you explain to the jury what this shows?

A Sure. So going back to red flag 2 is when a patient

travels more than 25 miles to see a prescriber. What is not accounted for in the McCann/Catizone methodology is for those prescribers who went to see a prescriber -- I'm sorry, for those patients who went to see a prescriber who was in Cleveland, and in many ways it would make sense that given the demographics there would be a lot of people going to Cleveland. You have the Cleveland Clinic, you have a high concentration of prescribers here in Cleveland. And also, Cleveland is also a hub city where a lot of people work.

And even Mr. Catizone recognized in his report there are life factors that people would need to consider, such as if you work in Cleveland, it is not unusual for you necessarily to see a doctor or a prescriber in Cleveland, nor would it be unusual to see a doctor at the Cleveland Clinic.

And there's no recognition of that in the Catizone/McCann methodology. They didn't account for that when they looked at the results.

And what you're seeing here is that 34 percent of the red flag 2s, so that second red flag actually picks up quite a number of red flags, 34 percent were related to a prescriber who was in Cleveland.

Q And was that, in your view, likely to be pretty normal patient behavior?

A My understanding is that that would be normal behavior

given what I discussed about the demographics and what's specific about Cleveland.

Q Is this something that Mr. Catizone and Dr. McCann could have done?

A Certainly.

Q And they didn't?

A They did not.

Q You're aware of the opioid strength, the MME guidelines that Mr. Catizone set forth?

A I am, yes.

Q And those were for red flags 10 and 11; is that right?

A That's correct.

Q Did you perform any analysis of the prescriptions that Mr. Catizone's methodology captured as calculated by Dr. McCann measured against the -- against strength guidelines?

A I did, yes.

Q Okay. And is that analysis on this next exhibit, which is CVS-MDL-4311A?

A That's correct.

Q All right. And this is -- I think you maybe have some charts or -- bar charts or something that may make this a little easier to see, but before we go there, you don't have to do this in gory detail, but at least give the jury an outline of what this table is reflecting.

A Sure. I'll try and be as quick as possible.

So you can see on the red flag column what's missing is 10 and 11. Those represent red flags that related to the MME guidelines or what -- again, as Mr. Catizone has put them forward. So if they were above a particular guideline, they would get a flag.

So what I did here is I examined all the red flags across 1 through 16 except for 10 and 11 to see how many of those prescriptions were under the MME guidelines.

Q Okay. And you did that in this column over on the right. Is that using Mr. Catizone's MME guidelines?

A That's correct.

Q Now, he had two different MME guidelines. Which one is this?

A This one is -- so he did have on the left, to the left, you have the 50 and then there was another MME guideline, but this one was related to 200.

Q And then it switched in 2018?

A In 2018 it went to 50, yes.

Q 50 or 90?

A Well, one was 50, one was 90. One of the red flags was 50, another one was 90.

Q All right. Let's go to the next exhibit, which is CVS-MDL-4313A.

And could you explain to the jury what this reflects?

A So this is just a bar chart of what we saw in the table before.

So under Mr. Catizone's MME guidelines, 97 percent of the prescriptions that were flagged fall underneath those MME guidelines.

Q And let's take a look at the next one, which is 4313B.

I should have asked in the prior exhibit, that was something that was prepared by you or at your direction?

A Yes, it was.

Q And is 4313B also prepared by you or at your direction?

A Yes, it was.

Q And what does this chart reflect?

A So whether you use a more conservative or lower MME guideline of 50, you still have approximately 70 percent of the other flags or the other prescriptions and the other flags falling below that guideline.

Q And so Mr. McCann -- excuse me. Mr. Catizone, one of his red flags applied this 50 MME guideline but only after 2018; is that right?

A That's correct.

Q And you're applying it all the way back to the beginning of the data?

A That's right.

Q And why did you do that?

A Well, again, this is a lower bound, so you could apply it to 50 -- 50 through from 2018 forward, but if you apply 50 across the board where the MME guidelines were actually higher, this will give you a more conservative estimate of what percentage of the prescriptions fell below that guideline at 50, which is the lowest bound of the guidelines.

Q And was it your understanding from what Mr. Catizone had done that he wouldn't have applied or he didn't apply, I shouldn't say wouldn't have applied, but he didn't apply the MME guideline back as far as you did. He only applied it from 2018 forward?

A That's correct.

Q So this is a -- I think you used the word "conservative." Is that how you view this?

A That's how I view it, it's a conservative measure.

Q And even with that measure, how many of the prescriptions that flagged and all the other flags are below that threshold?

A About 70 percent are below.

Q Okay. Did you also do a -- well, first of all, are you familiar with the terminology "retrospective flagging"?

A I am, yes.

Q And can you describe what that means in general, and then we'll look at a couple of the calculations or charts of

analyses that you did.

A Well, I put up a graph to show that, to illustrate that, but I can do that.

Q Okay. Let's look at this. But first of all, there are some red flags that this analysis that you're about to describe for the jury affect, right?

A That's correct.

Q Can you kind of describe what kinds of flags this analysis reflects?

A So this one, an example would be like red flag 3. So a patient sees a prescriber on day one, and then prior to -- let's say it's a prescription for 30 days. So just before 30 days they see a second prescriber. So one scenario could be the patient got a prescription from an emergency room doctor for 30 days. On the 28th day, that patient could have seen his practitioner and got a second prescription.

Because there's an overlap between the two prescriptions, the flagging methodology that is implemented by Mr. Catizone and Dr. McCann not only flags that second prescription, but also flags the first prescription.

So that's the retroactive flagging that is occurring here.

Q And why are you doing that calculation or making that calculation?

A Why is Dr. McCann and Mr. Catizone making it?

Q I understand, but why are you -- actually, I missed a step.

What are you calculating in your retrospective flagging analysis, which is -- is that what's reflected on CVS-MDL-4320A?

A It is, yes.

Q All right. So first of all, describe what you're calculating here.

A So what is in this table is for three particular flags. So red flag 3 I mentioned, that was the example I used where you have two prescribers, and there's an overlap in days.

There's also red flag 4 and red flag 15.

The retroactive flagging, and the reason I've done this calculation, is that the red flags, according to Mr. Catizone, reflect what the pharmacists knew or should have known at the time of prescription, at the time of dispensing. So this assumes that the pharmacists had perfect foresight as to what the patient would do. The pharmacists would know 28 days down the line that a patient would have gone for a second prescription.

But there's no way a pharmacist could have known that, and so what I'm showing here is that in the second column are those instances where the prior prescription where the pharmacist could not have known what would have happened in

the future was flagged anyway. And that occurs about 30 percent of the time for these three particular flags.

(Off-the-record discussion.)

BY MR. BUSH:

Q So you've testified about a number of analyses that you've done of Mr. Catizone's red flags as calculated by Dr. McCann and some of the other bigger picture analyses, like the percentage of doctors who are flagged.

Do these analyses, retrospective flagging, normal patient behavior, a huge share of flagged prescriptions that are below, Mr. Catizone's or even a conservative strength guideline, or the 37 percent of doctors who are caught up in Mr. Catizone's flags, do those analyses call into question for you the reliability of Mr. Catizone's methodology to identify red flags?

MR. WEINBERGER: Objection.

THE COURT: Overruled.

A Those conclusions do call into question the reliability. I think they also call into question the accuracy of Mr. Catizone and Dr. McCann's methodology.

Q All right. Now, you're aware that in this case there were -- there was a production of a sample of the prescriptions that flagged under Mr. Catizone's methodology and of the notes that were associated with that sample.

A Correct.

Q All right. And the notes were notes that either were or were not placed in the dispensing data in the files or contained on prescriptions that might have bore on whether or not a red flag was observed or resolved, right?

A That's my understanding.

Q Okay. And he reached a conclusion that in about 90 percent of the cases there were either no notes or not adequate notes.

Do you recall that?

A I do, yes.

Q And sample size was with a -- what do you recall the sample size was?

A 2,000.

Q Okay. And did you evaluate whether or not that analysis by Mr. Catizone and Dr. McCann was reliable?

A I did, yes.

Q And what conclusion did you reach?

A Well, it suffers from the fact that what I have seen in his analysis is it is generating false positives. It's not generating accurate -- an accurate reflection of what should be flagged based on what he is attempting to do. So it's not separating the wheat from the chaff.

If your -- if you have an issue, if there's an error on that first stage, and then simply sampling from that and then doing analysis of that is going to lead to an error.

And it's simple as garbage in, garbage out. If the flagging methodology is wrong, then the analysis of the sampling is going to be contaminated and affected.

Q And did you also evaluate whether Mr. Catizone looked when he did his analysis at all the information that was available to him that might have had some bearing on whether there was a red flag or whether there was a resolution of any red flag that might have existed?

A There was -- I didn't see any indication that he did that additional -- those additional steps.

Q And what other information did he have available in those Notes samples that he didn't bother to look at?

A He had available prior visits as an example from the patient.

Q Okay. And did he have available, at least to some extent in the CVS data -- we're only talking about CVS data here, right?

A Correct.

Q Did he have available in the CVS data notes that may have related to some of those prior prescriptions?

A I don't recall whether he had those available on the prior prescriptions.

Q Okay. Now, did you do an analysis of certain information about the patients and prescribers who were in the notes sample?

A I did, yes.

Q All right. And is that reflected on this exhibit -- or this -- I guess this is a demonstrative?

A That's correct, yes.

Q All right. Can you explain what this reflects?

A Sure. So the pie chart represents the 2,000 prescriptions, the CVS prescriptions that came from the sample.

One of the things that Mr. Catizone had available to look at was, okay, if you have the prescription in hand, how many times previously did that patient go to that same store, how many times previously did that same patient have what appeared to be a relationship with the particular pharmacy or particular store.

In 72 percent of the instances within the sample, a patient went to that same location six prior times.

Q All right. And then you have, I'm going to use my pointer here, you have this analysis over on the box on the right. Is that an additional analysis you did?

A Correct.

Q Can you explain what you're reflecting there?

A Sure. And again, I sightly misspoke. It's least six prior visits 72 percent had.

So what the box shows is that within the 72 percent, but that 31 percent of the prescriptions were for a patient

who not only had six prior visits to that location, but it was for the same prescription and it was from the same prescriber.

Q We're almost to the end, Dr. Choi. I have one little bit of housekeeping that I need to do.

MR. BUSH: Mr. Pitts, can I trouble you to put the ELMO up again?

Q So Dr. Choi, you have a box of exhibits or maybe a Redweld of exhibits up there?

A I do, yes.

Q And I will represent to the Court and to the jury in that the exhibits are listed here on what I've put on the ELMO, which is CVS-MDL-4969.

And I asked you to review these before we came to court so that we could save some time.

Are these data summaries that were prepared by you or at your direction?

A They are, yes.

Q And do they identify the source of the data that is reflected on the exhibit?

A They do.

Q And do they reflect your summaries of the data?

A They do.

Q And do they support at least some of the slides that you testified about today?

A They do, yes.

Q And in fact, some of the slides are actual copies of these exhibits, right?

A That's correct, yes.

Q All right. Now, I need to, you know, state for the record that there are some of the exhibits listed on here that we have removed, and that's CVS-MDL-04364, 04365, 04332, and 04332A.

But with that amendment, does this exhibit accurately reflect the documents that you've reviewed in the Redweld?

A It does, yes.

Q All right. Thank you.

THE COURT: What was the last one you removed?

MR. BUSH: 4332A.

THE COURT: Just so the jury understands what these are, could you ask the doctor to just talk about one of them so we can see what they are?

MR. BUSH: Sure. Let me just ask the question of...

Q Can I ask you, Dr. Choi, to -- well, actually I can put it up here on the ELMO if that's going to be acceptable to everybody.

This is CVS-MDL-3882A?

A Correct, yes.

Q And is that an example -- that's one of the exhibits

that's in the Redweld that I sent up to you, right?

A Yes, it is.

Q Okay. And this is actually one of the -- this is an exhibit that reflects information that was on one of the slides that you testified about?

A That's correct, yes.

Q Is this one that's talking about the similarity in the distance that somebody travels between the patient and the pharmacy between people filling opioid prescriptions and noncontrolled medications?

A Correct, for red flag 1, yes.

Q And are the other exhibits that are in the Redweld similar to this? Is this the kind of thing that's in the Redwelds?

A Yes, they are.

Q Okay. Thank you.

(Off-the-record discussion.)

Q Dr. Choi, we're just about to wrap up here. I want to kind of look back over the analyses that you presented to the jury here. And I want to ask you whether or not as a result of those data analyses, have you reached any overall opinions about Mr. Catizone's red flag analysis as it was implemented by Dr. McCann?

A Yes, I have.

Q Have you reached a conclusion about whether they

attempted to validate the methodology that they used?

A There was -- well, my conclusion is they have not attempted to validate their methodology.

Q And did you reach any conclusion about whether they attempted to take into account knowledge or information that might have been available to a pharmacist filling a prescription that is not reflected in the data?

A Based on my review, it does not appear that they attempted to do so.

Q And did you reach an opinion about whether they took into account even all the data that was in the database that they had available to them to run the red flag analyses?

A So they did not look for other information that was available to them.

Q And did you reach an opinion about whether or not this methodology was a reliable and validated basis to identify red flag prescriptions?

A So, yes, my opinion is that this is -- this methodology, the Catizone/McCann methodology that I talked about, is not a reliable methodology for analyzing this data set.

Q And just to jump ahead to maybe -- well, withdrawn.

You went through some of the calculations that said 30 percent or 90 percent, or whatever percent, would have, you know, been under the strength threshold or were over some

threshold or other analytical method that you used.

Are you saying that anything that was on the other side of that was a valid red flag?

A No.

MR. WEINBERGER: Objection.

MR. BUSH: I'm asking what his opinion is.

THE COURT: Overruled.

A No.

Q And why is that?

A Again, this is looking at various ways of examining the red flag methodology. It doesn't mean that the other end of it is valid. It's simply showing that, first of all, that Mr. Catizone and Dr. McCann didn't check to see if their results made sense, and the analysis that I conducted were checks on that. That doesn't mean that the other end of it is a valid -- or valid prescriptions or the methodology was valid.

Q So taking all of this into account, did you reach any opinion or do you have any opinion about whether Mr. Catizone's and Dr. McCann's overall conclusions about what pharmacists should have investigated and conducted due diligence on and documented is reliable and valid for making any decisions about Defendants' conduct?

A My conclusion is that it's not a valid nor reliable methodology.

MR. BUSH: Thank you. I pass the witness.

THE COURT: Okay. I assume there are no questions from Walgreens or Walmart. Correct?

MS. SWIFT: No, Your Honor.

THE COURT: Okay. Thank you.

Then, Mr. Lanier, you're up.

MR. LANIER: May it please the Court, ladies and gentlemen, Mr. Choi, Counsel.

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CROSS-EXAMINATION

BY MR. LANIER:

Q How do you do, sir. My name is Mark Lanier. I've not met you, but it's a pleasure to meet you, and hopefully I won't be long with you, okay?

A It's a pleasure to meet you, sir.

Q All right. I want to clear up a couple of things. We've got three stops. It won't take long. I want to talk about money and clarify a couple of things, I want to talk to you about numbers, and I want to talk to you about red flags, okay?

A Sure. I wish you had used a different picture, but --

Q Well, that's the best picture I could find. You're not exactly like all over the Internet on this stuff, okay? I think you look pretty good there.

A That's subject to your opinion.

Q Hey, hey, consider what I had to work with. No, I'm just --

A Fair enough, fair enough.

Q All right. With some measure of seriousness, I do want to talk to you about money because I think there are a couple of things that the jury hasn't heard that I think they may want to know.

First of all, you had your qualifications slide up here and you've got the schools down here. But where you really make your money and what you really do is your work with AlixPartners, fair?

A It's pronounced "AlixPartners," and that's my sole employer, yes.

Q And AlixPartners, you're actually a shareholder. You make money of the big business, right?

A So I do have an equity position, yes.

Q Equity position means big business makes money, you make money off of that, right? You get a cut?

A So we get -- I think it's worth explaining in more detail. So there is at the top when revenue does come in, we do pay expenses like any other business pays expenses, so we pay salary, overhead, we pay bonuses to our staff, we have other commitments. And at the very end there's a pool, a profit pool. It's not even a profit pool, it's after profits, and there is how our bonuses are determined.

Q So that's a "yes" answer. You get a cut off the profits of the business?

A A percentage of the profits, yes, that's right.

Q Yeah. Okay. And in this case you've billed $2.6 million so far?

A The firm has billed $2.6 million, yes.

Q That doesn't count the money that's billed in the Purdue bankruptcy, Purdue being the major opioid manufacturer, right?

A That's correct, yes.

Q You didn't tell the jury that in the Purdue bankruptcy y'all have also billed another $24 million, right?

A I don't know how much we billed on that bankruptcy.

Q Well, I think it may even be north of that. I've got in the order on the fee applications, one of the fee applications shows Alix at $23,948,226.50.

Does that seem about right to you?

A Mr. Lanier, I am not aware of the amount that was billed. There is an information barrier between myself and my colleagues for that bankruptcy.

Q Well, you say there's an information barrier. There's not a profit barrier. You get money off of that, don't you, at the end of the year?

A To the extent that after it washes through the expenses, there is -- it contributes to the profit pool,

certainly.

Q Yeah, all right. That's the money stop. I wanted to make sure we had everything on the table for the jury.

Now let's talk about numbers, and then we'll move to red flags, okay?

A Okay.

Q All right. Numbers. First of all, I need to ask you about some of your qualifications.

Do you have experience in the way CVS's pharmacies inventory for drugs?

A I do not.

Q And I've been asked a note to make sure, y'all in the Purdue bankruptcy are representing Purdue, doing work for Purdue; is that right?

A So I have very limited information about that. I do understand that the firm is retained by the debtors, but aside from that, I don't have additional information.

Q The Purdues and the Sacklers being the debtors there, or at least the Purdues, right?

MR. BUSH: Objection.

THE COURT: Overruled.

A Again, I don't have much visibility nor do I have information about that.

Q The reason I asked you about your expertise on numbers is because Mr. Bush put up here your slide that was

CVS-MDL-4340 that talked about the percentage of controlled prescriptions put out by CVS compared to noncontrolled.

Do you see that?

A I do, yes.

Q And you did the same thing not just for Lake County but for Trumbull County, didn't you?

A I did, yes.

Q And then you did the same thing combining them, correct?

A That's correct.

Q And yet what you never told the jury is -- and so we got this clear, noncontrolled means those that are not scheduled drugs under the Controlled Substances Act, right?

A Well, what I did tell the jury is that the controlled represents the drugs under the Controlled Substance Act, noncontrolled do not. And I provided examples of two types of drugs.

Q In other words, I'm correct, these are not scheduled drugs in that column. In this column are the scheduled drugs like opioids and benzos, right?

A That's correct, yes.

Q All right. I mean, I don't think we're fussing on that point. What I wanted to do is give you a copy of Plaintiffs' Exhibit 21912 and ask you if you bothered to count for the jury how many different drugs CVS sells in

their pharmacies. This is the October 2021, most recent update of their drug list.

Do you see that?

A Yes, I see what you've highlighted, yes.

Q And these are just for specialty pharmaceuticals.

Do you see that as well?

A I mean, I see the language, but whether they're for specialty pharmaceuticals, I'd like to take a further look for.

Q Well, my question to you is --

MR. BUSH: Your Honor, objection, please.

THE COURT: You're allowed to look at the document and then you can ask your question.

MR. BUSH: Can we have a side bar though? I think it's being displayed.

MR. LANIER: I'll pull it down while --

THE COURT: Why don't you just ask a question.

BY MR. LANIER:

Q My question is, did you count how many different drugs CVS sells in this nonscheduled category?

MR. DELINSKY: Your Honor, this doesn't pertain to retail pharmacies. This is an entirely separate kind of pharmacy CVS operates.

MR. LANIER: It's a specialty pharmacy -- it doesn't matter, Judge. I'm pull down the exhibit in the

interest of time, and I'll keep going anyway with the question.

Q Sir, did you count how many hundreds and hundreds and hundreds of different kinds of drugs CVS sells in this category?

A So these reflect percentages, so they're not accounts of drugs. So that's not reflected, nor the purpose of this table.

Q Is that a yes or no?

A Well, it's a yes in the sense that the number of drugs are not reflected in this column.

Q I said did you count the number of different drugs. You're saying yes, you did?

A No, I am simply saying that this table is reflecting the percentage of prescriptions.

Q We're not communicating, sir. I'm sorry. Hear me.

Take the table down.

Did you count how many different kinds of drugs CVS sells before you came in here and said 13 percent of the ones going out are opiates?

A So they would be in the file that's referenced in the table, and you could see the different types of noncontrolled drugs.

Q What question do you think I'm asking?

A I don't know then.

Q I'm asking did you count how many drugs they sell?

A So during the review, during the analysis, certainly we had that spreadsheet. I had the spreadsheet. We looked at -- we didn't do a count by count, though I certainly recognize the amounts, or roughly the amounts.

Q Roughly how many different drugs do they sell?

A It's a considerable amount. It's a large amount.

Q Roughly, what does that mean?

A Again, I don't have an exact number, but --

Q A thousand?

A Again, I don't have an exact number, but that ballpark would be -- it wouldn't surprise me if it was in that ballpark.

Q So let's just use that ballpark of a thousand.

So they sell 1,000 different kinds of drugs, and out of everything they sell, 12 to 13 percent are opiates.

A That's not the correct calculation, Mr. Lanier.

Q Okay. So out of the noncontrolled drugs, how many are there?

A So you're looking for the exact number of drugs?

Q I'll take it rounded, sir. I just want this percentage to mean something.

A The reason I said I don't think you calculated correctly is that you put 12 to 13 percent as opiates, but it's 12 to 13 percent for controlled.

Q All right. Opiates and genzos, controlled.

I still am asking you --

A Sir, Mr. -- I'm sorry.

Q Excuse me, I get to ask questions.

A Sorry.

Q I'm still asking --

MR. BUSH: Dr. Choi gets to answer it.

THE COURT: Just ask a question, please.

BY MR. LANIER:

Q I'm still asking you, sir, did you figure out -- so that this percentage has meaning, did you figure out how many different drugs they're selling?

A So Mr. Lanier, just a quick clarification again. I'm sorry to quibble about this, but I just want this to be accurate.

Q It's a simple question.

MR. BUSH: Let the witness answer.

THE COURT: Let the witness answer.

A So you have your 12 to 13 percent opioids and benzo. That's still not accurate. That's a misleading characterization of the 12 to 13 percent.

Q Sir, did you figure out how many different drugs they're selling, yes or no?

A For which category, the noncontrolled?

Q Yes, sir.

A I think I've already said that I didn't do a precise calculation. If you want to say it's a thousand, it's probably in that ballpark.

Q Okay. So when you do the statistics, you haven't looked carefully at whether or not most of the drugs being sold statistically wind up being opiates?

A That is incorrect.

Q You have done that check?

A No. What you're referring to is the objective of this table is to show a percentage. Whether you want to count them individually and then apply the percentage, the results don't change.

Q Sir, that wasn't my question.

I said, have you looked carefully at whether or not most of the drugs being sold wind up being opiates in terms of percentages.

MR. BUSH: Objection, Your Honor. He did answer that question.

THE COURT: He can ask it again. I'm not sure at this point.

A Mr. Lanier, I'm very confused with your question then.

Q Okay. What percentage of Z-Packs were sold?

A Again, I don't have that number off the top of my head.

Q What percentage of Resinovir [ph] was sold?

A Yeah, I don't have those percentages for that specific drug off the top of my head. But as a collective, those noncontrolled do represent about 87 percent.

Q Right, but if they represent a thousand different drugs, 87 percent is a different number than if they only represent a hundred different drugs, right?

A Well, Mr. Lanier, the issue is about the unit of measurement.

Q Can you answer my question, please, sir?

MR. BUSH: Objection, Your Honor.

THE COURT: Let's go on the headphones.

(At side bar at 4:09 p.m.)

MR. LANIER: Your Honor, I don't mind nonresponsiveness, but when I'm under this kind of a time deadline and he --

THE COURT: It no, no. His chart talks about number of prescriptions and you keep asking about number of drugs. His chart doesn't report the percentages of drugs sold, it's percentages of prescriptions.

MR. LANIER: But each prescription is of a drug, and the point is they have over a thousand drugs they get prescriptions for and that 12 percent or 13 percent of the drugs they're sending out are opiates is a massive, massive percentage when you consider how big the denominator is.

THE COURT: Well, I'm not sure that's what his chart says, but you can do -- anyone can do the math, 12 percent of a thousand is 120, but he said he didn't count.

MR. LANIER: And I just would ask him to answer my questions. I mean, he has wasted 8 minutes of my time.

MR. BUSH: Actually, I really object to that, Your Honor. He's answered the questions.

THE COURT: I think we should move on. I don't think we're getting anything productive.

MR. LANIER: Thank you.

(In open court at 4:11 p.m.)

BY MR. LANIER:

Q Sir, look, for example, at your chart 4346A. This is your chart where you show the opiate prescriptions going down.

Do you see that?

A Yes.

Q Did you take into account any of the policy changes at CVS where they started training and applying red flags in that time period?

A So this chart does not reflect or identify policy changes. This chart simply reflects over time the number of opioid prescriptions.

Q Is that a yes or a no?

A So in the chart you're not going to see what you've identified as these lines for a particular policy change.

Q Yeah, so my question was, did you take into account the policy changes on red flags in the training. Your answer is no, correct?

A That is incorrect.

Q You did take it into account?

A No, simply what I'm doing here is putting in the decline in the opioid prescriptions. It is why that's occurring, you know, I did not put in a particular policy implication.

Q I'm not asking did you put it in. I'm saying did you take it into account when you prepared this chart. Did you prepare the chart to show that change?

A No, I prepared the chart --

Q Thank you.

Next chart.

Median total of MMEs by prescriptions by pharmacy.

Do you remember this chart?

A Yes, sir.

Q Now, do you know what the most prescribed and arguably abused opiate is in the United States of America?

A The most prescribed, I don't know.

Q Did you know about hydrocodone, which is a low MME drug, being the most overused and overprescribed drug in

America?

Did you know about that?

A Again, I don't know if that's accurate. I have not checked for that.

Q But if it is accurate and you know that hydrocodone has a low MME of just 1, then we need to be looking down here for the diversion, not at these high cancer -- I mean high MME drugs like fentanyl, right?

MR. STOFFELMAYR: Judge, I'm going to object. That's demonstratively false.

MR. LANIER: It's not, Your Honor. It's dead on.

THE COURT: I'm going to sustain the question the way you asked it.

MR. LANIER: All right. I'll ask it a different way.

Q Sir, if in fact hydrocodone with a low MME of 1 is one of the greatest diversion drugs, we're going to find the pharmacies dispensing it at the low end of an MME chart, aren't we?

MR. BUSH: Objection.

MR. STOFFELMAYR: Same objection, Your Honor.

THE COURT: Overruled.

A So if I understand your question, you're asking me to assume that the low MMEs are more likely to be diverted?

Q Yes. If the low MMEs are more likely to be diverted, then on a chart like this you'd want to look to the right end of the chart, correct?

A Well, under that assumption, it's sort of a circular argument then. But again, my understanding of MMEs, especially as reading Mr. Catizone, is that's not the case.

Q That wasn't my question, sir.

A I thought I answered it.

Q No, no, it isn't even close.

I said if it's a low MME that is concerned, like hydrocodone, then we would look to the stores on the right side of the chart. True?

A I agree -- if that is the assumption, but again, it does seem like a circular argument.

Q All right. It may seem to you, but we'll keep moving on.

Let's go to flags. You talked a lot about flags, right, red flags?

A Yes.

Q Let's go over your qualifications to do that.

Have you read the *Holiday* or any other red flag cases?

A I have not.

Q Do you have any DEA training on red flags?

A I do not, no.

Q Are you competent to make dispensing choices and

opinions to dispense medicine?

A No.

Q Are you a licensed pharmacist?

A I am not.

Q Do you have experience of what information registered pharmacists have? And by experience, I mean hands-on experience.

A I do not.

Q Do you have experience in the -- or expertise in the dangers of opioids?

A Expertise, no, I do not.

Q Has any pharmacy ever hired you to write policies on red flags?

A No.

Q Did you see the requirements within CVS's own files that registered pharmacists should document the resolution of red flags?

A Only to the extent that they were reflected in Mr. Catizone's report. But if you're referring to a particular document, I can't recall one.

Q I'm referring to the CVS policies. Did you look at them on red flag resolution and documentation?

A No.

Q So with those limitations, you went and assessed what Mr. Catizone said, correct? Correct?

A I'm sorry, I'm reading your chart here.

Q Here. I'm just -- now, you assessed what Mr. Catizone said, correct?

A Well, I'm struggling with what you -- when you say "said" --

Q In his report.

A Mr. Catizone wrote in his report a particular methodology, and I assessed that.

Q He has testified very clearly to this jury that a red flag is a warning sign that requires additional review, that should be resolved before dispensing, and that that's a critical responsibility.

Is that consistent with what you thought a red flag was in his mind?

A So that is not consistent with what he wrote in his report.

Q All right. If that is -- it's not consistent with what you see in his report. I understand.

If this is in fact what his testimony is, then it kind of undercuts everything you've been saying, doesn't it?

A I don't think so.

Q Well, let's look at it and see.

First of all, you say that -- let me put this slide up.

And you say that there's a problem because

Mr. Catizone is flagging so many prescriptions, right?

A Mr. Lanier, you're mischaracterizing my testimony. That's not what I said.

Q Okay, good.

So you're not saying that Mr. Catizone flagged too many prescriptions?

A No, that's not what I'm saying. What I'm saying here is that the flagging methodology that Mr. Catizone has applied, and when you compare it with other sources, when you're doing the checks on it, it does indicate that there are false positives, and there are. There is overflagging going on.

Q But doesn't everybody believe there should be false positives?

A You're talking about it in like a binary sense, like false positives are harmless. That's not accurate from a data standpoint.

Q Time out, sir.

You've already said you don't understand -- you don't have the expertise of how dangerous these drugs are. Fair? That's not your expertise?

A That is not my expertise, fair.

Q All right. Did you come into the building downstairs?

A Yes.

Q Did you go through the metal detector?

A I did, yes.

Q Did you know 99.99 percent of the people that go through that metal detector are just trying to do their civic responsibility?

A I don't have the number, but I would imagine everyone is trying to do their civic responsibility.

Q Well, not everyone. There's some criminal cases that get tried in this courthouse where there's a need for extra care because of the level of criminality involved.

Do you understand?

A With that additional information, thank you, yes.

Q Yeah. And so when this metal detector goes off, it's going to go off a lot of times with a false positive, isn't it; somebody's belt, somebody's shoes, cell phone, right?

A Well, the false positives probably, but how the machine is calibrated will affect the rate of false positives.

Q And there's no question about that.

And the greater the danger zone, the more important to calibrate the machine carefully, right?

A I would assume so, yes.

Q And then when someone comes through, if it triggers a red flag for that person down there who's manning the metal detector, before that person's allowed to go through, that needs to be resolved why they triggered the machine, doesn't

it?
A I would assume so, yes.
Q And that's not a bad thing, is it?
A So in that example, I don't have any issue. But the example here when you're talking about red flags and what Mr. Catizone has done --
Q We'll get to that in a minute. Stay on my example.
MR. BUSH: Your Honor, please let the witness finish his answer.
THE COURT: I think he answered the question.
Q My example here, sir, that's not a bad thing, is it?
A Again, your example, as I've heard it, and as I understand it, I don't think it's a bad thing.
Q I mean, if you had tripped the metal detector -- did you trip it, by the way?
A I did not.
Q All right. Well, if you had tripped and they had said to you, ah, you look nice, go on by, they wouldn't be doing their job, would they?
A If I tripped it, I would expect to be stopped, yes.
Q And you would expect them to figure out whether or not it was safe to let you by, right?
A Or send me back.
Q Right. And once they do that, if it's safe, you get to come up to 18 and testify, right?

A I think I'm following you, yes.

Q If instead they had determined, no, you've got a knife and you're not going in like that, you're either going to give up your knife or you're not coming in, right?

A That's assuming I owned a knife. But, no, I assume so.

Q All right. So you're not in a position from expertise to testify whether or not a 30 percent flag or a 40 percent flag is appropriate as a warning just to make sure that you clear it before you sell it. You don't know whether those percentages are right or wrong as a pharmacist with pharmacist experience, true?

A So I can certainly compare those numbers with other data to perform an opinion about the false positives, and also the fact that it's not just a consequence of whether you're checking. It's what Mr. Catizone is doing with his data that is -- that's where the false positives are becoming problematic.

Q Sir, you don't know whether those percentages are right or wrong as a pharmacist with pharmacist's experience, true?

A That is true. I'm not a pharmacist, yes.

Q Thank you.

And then you say that you saw nothing in the documentation that says they validated their analysis,

correct?

A That's correct.

Q Did you see that Carmen Catizone looked at each individual prescription?

A You're referring to the sample?

Q Yes, sir.

A Okay. Well, there's evidence from my review of his analysis that he did not carefully look at each one.

Q I understand you have problems with two or three of the ways -- of the ones that were produced to us by defendants. I'm not getting into that.

I'm simply asking you, did you know he looked at each one?

A I understand from his report that he spent, again, I forgot the calculation, but it wasn't a very long period of time. And as I said before, based on my review of his analysis, it does not appear that he looked at each one carefully.

Q So you're forming a judgment on how well he did it, but my question to you was did you know he did it?

A My understanding is that he claims that he looked at each one.

Q And you, never having been a pharmacist, don't know how a pharmacist should be looking at those to validate them, fair?

A Well, it's fair that I'm not a pharmacist, that's correct.

Q And so you don't know how a pharmacist should be looking at those, true?

A Well, I certainly understand the -- in terms of what was written in the reports, that's my knowledge. That's where I'm forming my opinion. In terms of how pharmacists should make their, you know, their judgment is based on my reading of the report.

I don't have an expertise, I'm not claiming to have an expertise, but it's certainly information that I considered.

Q And so you don't know how a pharmacist should be looking at those, true?

A Well, correct, I'm not a pharmacist.

Q Thank you.

Next. You put up this slide as an example of how many folks, and the distance between patient and pharmacy, and what's less than or equal to 25 miles, and what's greater.

Remember the 25-mile issues you had?

A Correct, yes.

Q Did you know that the reason Dr. Franklin got caught filling his prescriptions, having his prescriptions filled in another county, is because they were 35 miles apart?

MR. STOFFELMAYR: Objection. That's exactly false.

MR. LANIER: Not exactly false. I'll reword it.

MR. STOFFELMAYR: We already heard -- we've heard testimony on this subject.

THE COURT: All right. Let's rephrase the question.

MR. LANIER: I'll rephrase it.

BY MR. LANIER:

Q Do you know the distance between Dr. Franklin and the pharmacies that were filling his prescriptions?

A I'm trying to remember the issue here. I don't know if I looked at that.

Q Okay. How about the cash payment issue? On cash payment, you said there's just not much difference between the 4 1/2 and the 3.2 between opioids and noncontrolled medicines or the benzos and noncontrolled medicines, right?

A Well, I did say there are differences, but the differences are not material.

Q Well, you said they're not material.

What's the difference between 4.5 -- we'll take the lesser -- and 3.2?

A So that would be 1.3.

Q About 30 percent?

A 1.3 over 3.2 would be roughly about -- a little over 30 percent, yes.

Q Mm-hmm. So 30 percent more paying cash for opioids than paying cash for other prescriptions, right?

A Right. And you're going to get that when you see so low percentages.

Q 30 percent more, correct?

A The math is correct, sir, but I think the logic is a little -- needs -- I think there's clarification that's needed.

Q And y'all's opioid invoices at this point are in excess, if we add the Purdue, of $28 million?

MR. BUSH: Objection.

THE COURT: Overruled.

A I'm sorry, what's the question?

Q Y'all's opioid invoices at this point, if we add together Purdue, you're over 28 -- yeah, over $28 million?

A Again, I don't know how much we've invoiced or how much we've billed for Purdue. If the number you've presented is accurate, then that's the way the math would work, yes.

Q And yet you are an equity holder who's going to make a percentage at the end of the year based on the profitability, right?

A Yes.

Q And you deal with numbers for a living, don't you?

A I do, yes.

Q And you're telling us that you've not looked at the profitability of your firm to see how your end of the year money is going to be?

A That is not my testimony.

Q Okay.

MR. LANIER: I'll pass the witness, Your Honor.

THE COURT: Okay. Before Mr. Bush gets up, any of the jurors have any questions for Dr. Choi? If you could give them to Mr. Pitts, please.

(Juror question review.)

MR. STOFFELMAYR: Your Honor, if it's all right, we'll go out of order. I will be extremely quick and then Mr. Bush can go through the questions.

THE COURT: Okay. That's fine.

MR. STOFFELMAYR: Thank you. Good afternoon, everybody. I need to apologize for the feedback, I do not in fact have a plate in my head that's causing that. I don't know what the reason is.

Every time I lean forward to the microphone the room explodes with feedback. I don't know what it is about my body --

MR. LANIER: It's the filling in your teeth.

MR. STOFFELMAYR: It's the filling in my teeth, the plate in my head. I'm not sure.

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CROSS-EXAMINATION

BY MR. STOFFELMAYR:

Q Dr. Choi, my name is Kaspar Stoffelmayr. I represent the Walgreens Company, and I will be very, very quick.

But just so everyone understands, we've never met, spoken in our lives as far as I know. Is that correct?

A That's correct.

Q You've never spoken to anyone else on the team representing Walgreens. You didn't know I was going to ask you any questions?

A That's correct.

Q All right. I just want to ask you about this chart that you were asked some questions about. I'll zoom out just a little bit.

And it was proposed to you hypothetically that hydrocodone, which is a relatively low MME drug, is the most overprescribed, most diverted, most dangerous drug in America.

Do you remember that?

A Yes. That was what he asked me to assume, yes.

Q And so the suggestion was if we're worried about diversion, we should focus on these folks at Lake Health Pharmacy down here, Target, Marc's, because these are the people dispensing the lower MME prescriptions; correct?

A Correct, that's the implication.

Q Then he said, in that case we wouldn't worry so much about these guys up here, like the guys at Overholt's, who went to jail, or the guys at Franklin, right?

A That's the implication of the assumption, yes.

Q Okay. Let me ask you to assume something different, that the testimony from a former DEA official, just assume with me, was that hydrocodone is the most dispensed drug in America. They didn't say anything about whether it was more likely to be diverted, abused, involved in criminality.

Can you assume that?

A Okay.

Q If we made that assumption instead, would that change your view about whether we need to focus on Lake Health Pharmacy rather than Overholt's?

A Well, certainly you would need to focus on what's on the left side here.

Q The left being the MME?

A The higher MME per prescription.

Q All right. Next question. I don't know if it was intended to be misleading or confusing, but I got the impression from the questions that the analysis we're looking at here is MME per pill; because a hydrocodone pill is lower -- 5 milligrams of hydrocodone is lower MME than 5 milligrams of oxycodone, correct?

A Correct.

Q But 10 hydrocodone pills is higher MME than one 5 milligram oxycodone pill, correct?

A Correct.

Q This chart you've shown us, is it MME per pill or MME per prescription, or what are we looking at?

A It is MME per prescription. As I mentioned before, if you see the 375 by the CVS number, that is the MME per prescription. It is not -- it's not -- it should not be construed as MME per day or anything like that. It's just the MME per prescription.

Q So even if every one of these was hydrocodone only, that relatively low MME drug, the folks over on the left side would be filling prescriptions with way more pills than the folks over on the right side?

A That would be the way the numbers work, yeah.

Q Nothing here tells you who is prescribing more hydrocodone, more oxycodone, more hydromorphone, anything like that, does it?

A That's correct.

Q Doesn't tell you who's prescribing a small number of high MME -- sorry, dispensing, not prescribing, my mistake -- doesn't tell you who's dispensing a low number of high MME pills versus a large number of low MME pills. Does it allow you to draw any conclusions about that?

A Not from the calculation of MME per prescription.

MR. STOFFELMAYR: Thank you so much, Dr. Choi. Those are the only questions I had for you.

THE WITNESS: Thank you.

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REDIRECT EXAMINATION

BY MR. BUSH:

Q Dr. Choi, we have a process here that you may know about where the jurors ask questions at the end of cross-examination. And the lawyers, assuming -- I mean, there may be a question here or there that for some reason just isn't a question we should ask, but for the most part we've been putting the questions up on the ELMO and asking you to answer those questions, and that's what I'm going to do first.

You should answer them to the best of your ability. Obviously if it's something that you just don't know the answer to, then you don't know the answer.

A Okay.

Q All right. So the first one is -- and I'm going to read them into the record just so that there is a record of what the question is.

"4337 CVS, what is your number instead of McCann?"

I guess it's "your number for opioid instead of McCann." And I'm going to put the exhibit or the chart that

I believe this refers to up on the screen and ask you if you can answer that question.

And if I can interpret a little bit, I believe that the juror is asking the question about the 6.38, Dr. McCann's annual hydrocodone -- oxycodone and hydrocodone DU per capita?

MR. WEINBERGER: Annual. It says "annual."

MR. BUSH: I'm sorry if I misspoke. I didn't mean to.

A Can I see the question laid on top, please?

Q Sure. Here's the question: "What is your number for opioid instead of for McCann?"

A So I didn't do an alternative calculation for the 6.38, so I'm simply comparing the 6.38 to the 132 on the noncontrolled; but I didn't form an alternative calculation for that number.

Q Okay. I may add some questions here or I may not, but on this particular one, why did you rely on Dr. McCann for this number?

A It's, again, the number that he calculated. I'm familiar with the data source that he calculated from, but I was simply trying to put perspective around the 6.38, so I didn't feel a need to recalculate the number.

What I'm doing here is -- even accepting the number, what is the context you should look at, how you should look

at that number.

Q All right. And are you -- you've read the complaints in these cases?

A I have, yes.

Q And you're aware that the plaintiffs have alleged that the defendants here have, quote, flooded, closed quote, the counties with opioid medications?

A I understand that, yes.

Q And do these numbers on this exhibit, including the per capita number, are they intended to put that allegation in context?

MR. WEINBERGER: Objection.

THE COURT: Sustained.

Q What was the purpose for putting -- one of the purposes for putting these numbers down in light of those allegations?

MR. WEINBERGER: Objection.

THE COURT: Let's go on the headphones a minute.

(At side bar at 4:38 p.m.)

THE COURT: Is this out of his report?

MR. BUSH: I'm sorry?

THE COURT: Is this out of his report? This chart.

MR. BUSH: Yeah, he testified about it on

direct.

THE COURT: How does this relate to opioid prescriptions?

MR. BUSH: Because it's putting in context -- can I answer?

THE COURT: Yes.

MR. BUSH: It's putting in context the allegation that these are a lot of drugs that are coming in -- a lot of opioids that are coming into the counties.

This just shows that there's actually just a lot of drugs that come into the counties because the population demands it, and you're seeing an amount of nonopioid prescriptions that are coming in that dwarf the amount of opioid prescriptions.

And Mr. Lanier was able to do cross on that and say that it was -- he did his numbers, but it seems to me it's fair redirect.

THE COURT: Well, you can --

MR. WEINBERGER: Your Honor, he asked him in relation to -- in relation to the allegations that they flooded the -- I mean, he has no expertise to testify about that.

THE COURT: He can authenticate this and say this is what this shows, a very large volume of noncontrolled prescriptions from CVS each year, and it

continues to escalate. That's fine.

MR. BUSH: Thank you, Your Honor.

THE COURT: But what you put in was argument from counsel, not something from an expert report.

(In open court at 4:40 p.m.)

BY MR. BUSH:

Q So does this chart that you've already testified about and that Mr. Lanier asked you about show that the amount of noncontrolled substance dosage units per capita that have been dispensed in Lake and Trumbull County dwarfs the amount of oxycodone and hydrocodone dosage units that have been dispensed in the county?

A It does show that. It's about 21 times larger for noncontrolled.

Q Thank you.

All right. This is another juror questionnaire [sic], and I'll read it into the record. I think I'll read them one question at a time.

"Are you using the exact same data as Mr. Catizone and Dr. McCann to do your analysis?"

A I am using part of their data. So as you saw, I also included analysis of noncontrolled substances, so that's analysis that I did. But the analysis related to the opioid prescriptions, that database, I'm using the same data.

Q And again, let me follow up a second.

The dispensing database for CVS dispensing was the database of information about dispensing that was produced by CVS, right?

A That's correct, yes.

Q And the OARRS database was a database about dispensing that was produced by the Board of Pharmacy?

A That's my understanding, yes.

Q So the next question is, "CVS-MDL-4346A" -- I'll get that, but the question is, "Is this for all CVS pharmacies or only in Ohio?" So 4346A is up on the screen, and that's what the question is about.

So is this for all CVS pharmacies or only in Ohio?

A It would be for the pharmacies within the two counties, Lake and Trumbull.

Q And then this last question is, "CVS-MDL-3882A, for greater than 25 miles or less than 25 miles? Isn't the flag for greater than?"

MR. BUSH: And can you put that up on the screen, please?

I need the screen back, Mr. Pitts.

Q Do you have the question, or should I read it again?

A I think I understand.

So on the left is less than or equal to 25 miles, and that's what the 97.4 percent reflects, is that in this case the number, the percentage of patients who see a pharmacy or

go to a pharmacy that's less than or equal to 25 miles, so that wouldn't get a flag. But the flag is 25 -- more than 25. So if it's 26 miles, it would get a flag. If it's 24, it would not, or 25 it would not.

Q So I hope I'm not misinterpreting the question, but if you were to calculate the percentage of prescriptions that were flagged for all three of these categories of medication, you would subtract the percentage you have listed there from a hundred percent; is that right?

A Correct.

Q So for opioids, it would be?

A 2.6 percent.

Q And for noncontrolled medications it would be?

A 2.2 percent.

Q Thank you.

And I guess I might as well finish it out.

And for benzos and muscle relaxers?

A Would be 1.8 percent.

Q All right. So I'm going to use, although if we need to we can go to all of these different exhibits, but "The source cited at the bottom of CVS-MDL-4352, 4363, 4967, 4328, 4346, and 4340, did you physically go through all the data to obtain these calculations?"

MR. BUSH: Could you pop up 4342, see if that will do the trick?

Q There's obviously a bunch of charts in here and we can go through others of them, Dr. Choi, if you think you need to to answer that question.

A I'm sorry, can you put the question on top again so I can see it again?

Q I can't because it's not the ELMO question, but I'll read it to you again.

"The source cited at the bottom of CVS-MDL-4352," which this one happens to be, and then a list of others that I read before, "Did you physically go through all the data to obtain these calculations?"

A So I think the answer is yes, we did go through the data set. But again, everything's on screen, so we're not, like, physically going through it, but we have the data set in electronic form, and we're analyzing the data in electronic form.

But so I guess it's not physical in that sense, but we did go through the data.

Q All right.

MR. BUSH: Can I have the ELMO back, Mr. Pitts?

Q So this question is, "To obtain the percentages on your report, you just used the data of the expert reports by Mr. Catizone and Dr. McCann?"

I guess that's a question.

A For some of the tables I used the data that Mr. Catizone and Dr. McCann used.

As an example, for the noncontrolled calculations, I used additional data. So I used more than just what Mr. Catizone and Dr. McCann used.

Q And the data, just to touch on it again, was data that was produced by the Board of Pharmacy or by CVS?

A Correct, yes.

Q Which is the same data that Dr. McCann used?

A For the red flag -- well, for the noncontrolled --

Q No, not for the noncontrolled, for the dispensing information.

A Yes, that's the same data.

Q All right. This question is, "CVS-3882, 3887, 3896, 3886, and more, which counties are these totals calculated?"

MR. BUSH: And could we at least pop up the first one of these and see if that sets the context for the questions?

Q So do you have the question or should I read it again?

A I understand the question. This is for both Lake and Trumbull.

Q Okay. So this question is, "Of the 2,000 prescriptions you reviewed from CVS, how many (what percentage) of those had red flag resolutions documented?"

A Is this referring to -- I'm assuming this is referring

to the 2,000 that was in the sample from Mr. Catizone.

Q I think that's probably a good inference, but we can't ask the jurors questions, so you're --

A Sorry about that.

So, I'm sorry, could I have the question back, please?

Q Hold on a second.

"Of the 2,000 prescriptions you reviewed from CVS, how many (what percentage) of those had red flag resolutions documented?"

A I don't recall the specific percentage of the 2,000. But, again, it's -- again, I'm not sure if I'm answering the right question here, but I wasn't asked to do that piece of it, to do that calculation.

Q All right. Can we go back to the prior question? And I think I just showed you CVS 3882, but -- and you answered that those were for the two counties. And perhaps we ought to look at the others.

Do you know, without looking at the others, that they did involve the two counties, Lake and Trumbull, which is I think what your answer was as to 3882?

A Yeah, generally if I didn't specify the county, it's for both counties. If I specified one particular county, it would be for that particular county, but most of the tables reflected both counties.

Q All right. Thank you.

This is another juror question. "Do you agree there is an opioid epidemic?"

A So, you know, I'm an economist, and certainly there is a problem. I recognize that there is a problem.

I'm not an epidemiologist. I can't define, it's not in my vocabulary to define what an epidemic is. It's just not my specialty. But I clearly understand that there's a problem.

Q All right. I guess we'll take that as a yes.

"Do you agree that every prescription for an opioid, whether for a legitimate medical purpose or not, is a potential addition to the epidemic?"

A So the -- I think I understand the question. It's just that this isn't my area of expertise, and so I -- the way I would answer is from a layperson, lay perspective.

Again, I'm an economist. I understand the issues. I understand that there's a problem. I understand that there could be a potential for addiction.

But, again, beyond that, this is not really my area of expertise.

Q All right. Next question. "All the red flags could have been explained if there was proper documentation, true or false? Doesn't proper documentation help the patient as well as the other pharmacists?"

A So I think this goes to the concept of what I talked

about before about the false positives. So if I'm understanding this question, and I think I used this example before where a pharmacist knows the patient, knows that the patient works in Cleveland or goes to the Cleveland Clinic but lives in Trumbull.

If the -- my understanding is if the pharmacist determines that that is an appropriate prescription, that there wouldn't be documentation. But if there's a false positive and you're assuming that that is already a -- again, a flagged prescription, then there would be confusion as to what documentation there could and couldn't be.

So that's the problem when you have false positive, is it confuses what the ultimate answer is going to be because you have to make some strong assumptions. And if your assumption is that everything flagged needs to be documented, but in reality some flags are false positives, it's going to affect how you can come to a conclusion.

Q All right. And then the last juror question I have, "If you're not a pharmacist," which you're not, "how can you assess the accuracy of the prescription documentation with the consideration that Catizone is a pharmacist?"

A So the way that I look at it is my expertise is in data analysis and examining what the right way to do data analysis is. And I agree, I'm not a pharmacist, but how to do data analysis doesn't change if you're a pharmacist or if

you're a different profession.

You have to first look to see what's in the data, what limitations there are in the data, and you have to check the results. If you don't do that, regardless of what profession you're in, then your data analysis is incorrect.

And so I'm here to talk about what the right methodology is, how you should be doing data analysis. And so if the methodology is wrong, the methodology is incorrect, not well thought out, then its accuracy will be affected.

Q All right. And then the second question from this juror is, "Please explain the 30 percent error rate associated with flags 3, 4, and 15 again. Can you give a number of how many prescriptions this flagged out of the total?"

And perhaps we ought to put that chart back up --

A Yeah, that was --

Q -- so maybe it will help you.

It's 3420A -- I'm sorry, 3320A.

Here, I can put it up on the ELMO. That's fine.

Do you have the question, Dr. Choi, before --

A I thought that was related to the retroactive flagging.

Q So here, I think this is the chart that this question refers to. I hope I've got that right.

So the question again, here, I can put it up here and then I'll take it away, "Please explain the 30 percent error rate associated with flags 3, 4, and 15 again. Can you give a number of how many prescriptions this flagged out of the total?"

A Sure. So again, just for clarification on what these numbers mean, the 30 percent is simply the percentage of the flagged prescriptions that also had a retroactive flagging.

So what this simply means is that for red flag 3 there were 21,929 prescriptions flagged under that flag, but 7,205 of the 21,000 were for a prior prescription, the retroactive flagging. And that's true for the other two.

So you can take a look at the bottom on red flag 15, 210-day supply. 45,571 prescriptions were flagged. Of that number, 13,582 had that prior flag where there was a look-back to flag.

Q All right. And you're not saying, I think we went over this before, that all the ones that didn't retroactively flag, so the ones in the retroactive flagging column, we take those away, you're not saying whatever's left was -- should have been flagged, are you?

A No, that's not what I'm saying.

Q So Mr. Lanier asked you some questions about -- he used in part of his questioning, I think talking about the security system downstairs, calibrating the machine and, you

know, why wouldn't you want to have it be really broad and just have a lot of prescriptions flagged here because they're dangerous, and I think you were trying to answer why that might not be a good idea, so I want to give you an opportunity to explain why that might not be such a good idea.

A So when doing data analysis and you recognize that there is an error rate, there's a potential for error, you don't just glide over it and then make an assumption about it.

So as an example here, there is a possibility, a very strong possibility, that the amount of flagging that's going on under the Catizone/McCann methodology is quite large. There's a quite large number of false positives.

The reason it matters is that when you go to the sample, when you go to the notes, even though there could be a large percentage of red flags -- I'm sorry, false positives, Mr. Catizone then assumes that everything that was flagged had to be documented, and that's not a correct assumption when you are dealing with false positives, because then you're making an assumption that can then further down the line affect your conclusions.

So identifying false positives is very important. It's important for accuracy, it's important for reliability.

Q All right. Thank you.

Mr. Lanier asked you some questions about your compensation at AlixPartners, and he specifically asked about Purdue Pharma.

A Yes.

Q And just -- you mentioned a wall. And could you just explain a little bit more? I'm not sure that the concept of a wall ever got out well enough that anybody would understand it. But what does that mean?

A My apologies for that.

Q No, I don't think it was -- I think Mr. Lanier was moving pretty fast.

A So what we mean by this is that there is a project that Mr. Lanier referred to. What I meant by the information wall is that I do not speak to any of my colleagues who are related to that project. We do not speak at all about what they're doing. They don't speak to me or my team about what we're doing on this case. And I take that very seriously. And that's why I do not follow the news as to what's going on, because I take that wall very seriously.

Q All right. And you testified a little bit about your compensation, and I want to take you back to what you said at the very beginning of your testimony about the organization of the firm, Alix, and to business units.

A Correct.

Q And is your -- and you mentioned your bonus before in response to some of Mr. Lanier's questions.

Is that based on your business unit or -- and your performance in your business unit?

A It is largely based on our business unit. So there are, as I said, five different business units at AlixPartners. The Purdue matter that Mr. Lanier referred to is in a separate business unit.

Q Is that the Restructuring business? Is that what it's called? I don't know what it's called, but is that what it's called?

A It's close enough, but, yes, Restructuring is fine.

Q I know you have kept the wall at Alix, but from just reading in public, do you understand what has happened to the debtor in Purdue?

A It would be very limited. Again, I try not to read too much about it.

Q Do you understand that it is being reorganized so that it will be for the benefit of the cities and counties who have suffered or can prove that they have suffered in the opioid crisis?

A That I do understand, yes.

MR. BUSH: All right. I pass the witness. Thank you.

Oh, you know what, I have one other thing that I need

to do. Will you indulge me? But I need your chart.

(Off-the-record discussion.)

BY MR. BUSH:

Q So, I'm sorry, Dr. Choi, I have one other set of questions here.

And you remember this chart that Mr. Lanier put up on the ELMO?

A I do, yes.

Q So one of the people that you're responding to is Dr. McCann, right?

A Correct.

Q And you read his report?

A Yes.

Q And you read his CV?

A Yes.

Q And you read whatever he said about his qualifications in his report?

A I did, yes.

Q So is he competent to make any dispensing choices or opinions?

A No.

Q And is he a licensed pharmacist?

A Not to my knowledge.

Q Did he say that he had any experience of what information pharmacists have?

A Again, not to my knowledge.

Q And did he say that he had any expertise in the dangers of opioids or opiates?

A No.

Q And did he say he had any expertise -- I'm sorry, did he say whether any pharmacy had ever hired him to write policies on red flags?

A I don't recall. I don't recall him saying he did.

Q Did you see -- did you see that he said anything about -- express any opinion about whether there are requirements that pharmacists document red flags?

A I didn't see that.

Q And did you see that he said he had any DEA training on red flags?

A I don't recall him saying that.

Q And did you see that he said anything about whether he read the *Holiday* or any other red flag cases?

A I don't recall that being in his report.

Q All right. And I'm not going to write on Mr. Lanier's chart here, but if I put up here "Did you," talking about you, "did you do anything to validate the methodology that you applied to identify the red flags in this case," and you -- he would put -- what would he put there?

A Well, I would put a yes. Based on my review of Dr. McCann's analysis, he would put a no.

MR. BUSH: Thank you.

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RECROSS-EXAMINATION

BY MR. LANIER:

Q But you were criticizing Mr. Catizone with these red flags too, weren't you?

A I was criticizing his methodology.

Q Right. And he is all of the things on here, isn't he?

A Again, I don't remember all of his qualifications.

Q Next. You were asked a jury question about do you agree there's an opioid epidemic. Remember?

A Yes.

Q And your answer was, I'm not an epidemiologist.

A Exactly the way I said it.

Q Right. And but you've got to -- I'll let you in on a secret. The juror that asked that question based on the questionnaires of all of these jurors isn't an epidemiologist either, so could we maybe just use the common definition of "epidemic" and ask you the question, if you understand that when ordinary people use the word "epidemic," they're meaning "affecting or tending to affect a disproportionately large number of individuals within a population, community, or region at the same time."

A Okay.

Q If we look at an epidemic like that, would you agree

there's an opioid epidemic?

A So that's --

MR. BUSH: Your Honor, object. That was outside the scope.

MR. LANIER: That was a juror question.

THE COURT: Overruled. We went through this with a juror question.

MR. BUSH: Fair enough.

THE COURT: You may answer, sir.

A Can I have of the definition back, please?

Q The definition was, "affecting or tending to affect a disproportionately large number of individuals within a population, community, or region at the same time."

A So the way I read that as someone who is -- again, my focus is usually on data. The way I would read that is that there is some level of expertise and there's also -- it's an empirical issue about what does the data support.

Q The next set of questions.

You were asked did you go through the calculations. You answered "we" did. The juror may have meant y'all, but may have meant you specifically.

So my question is, did you go through those calculations individually?

A Well, not every -- depends on which table. Some calculations I did, some calculations my staff or my team

members did.

Q All right. Next set of questions.

Mr. Stoffelmayr from Walgreens got up and asked you about hydrocodone and which end of the chart, and all the rest of that.

Remember those questions?

A Yes.

Q I want you to assume with me that the testimony from Joe Rannazzisi was that hydrocodone was the number one prescribed drug in the U.S.

Are you with me so far?

A I'm sorry, can you please stop scrolling for a second?

Q Here. Let me go back.

A Your finger's not helping right now.

Q "Hydrocodone was the number one prescribed drug in the United States, period."

You with me?

A I see that, yes.

Q Assume with me he says, "And in my opinion, while I was working at DEA, we saw wholesale abuse of hydrocodone, and it just struck me that we were consuming 99 percent of the world's hydrocodone. It was the number one prescribed drug, and there had to be something going on other than appropriate medical care with this drug."

You still tracking with me?

A Yes.

Q And then oxycodone he put right up there with hydrocodone.

Now, oxy is a 1.5 MME, correct?

A That's correct.

Q It's very low also, true?

A Relatively low, yes.

Q And it was right up there with hydrocodone as the most abused opioids in the United States at that time.

Do you see that, sir?

A I see the answer, yes.

Q And so now if we go back to that question I had been asking you and that Mr. Stoffelmayr asked you, we're back to the left -- or to the right end of that chart, aren't we?

MR. STOFFELMAYR: Objection. I've got to object.

A I don't --

THE COURT: Overruled.

A If I'm understanding your question, I don't think that's the right way to look at the chart.

Q Well, that's where the hydrocodone and the oxycodone are going to be, the low MME drugs, aren't they?

A That's where -- again, those are per prescriptions, and that's the median per prescription.

Q Yes, sir.

A That doesn't tell you specifically what that prescription was.

So if it was -- also, it was a total amount, so that's not information you can extract from that particular chart.

Q Your chart may not be too useful?

A No, it's very useful, but not for your question.

Q Well, actually it is. If it shows which ones had the lower sales -- I mean the greater sales of the lower MMEs -- all right, we'll leave it where it is.

You've got a wall at the company on the Purdue money, Purdue work?

A So as I explained before, there's an information wall.

Q Is that because you have a conflict?

A No, it's not because of a conflict. It's because we want to be very careful about things like this.

Q But you're able to make money on both sides that way, aren't you?

A I don't understand what you mean.

Q Okay. And then false positives. You keep calling them false positives.

Have you ever seen that in any DEA literature in your entire existence, the idea of a false positive red flag?

A I don't recall the word "false positive" in the DEA literature that I've seen.

Q And you've never seen that in any CVS literature, have

you? Have you?

A I'm trying to remember. I'm not recalling, no.

Q Because false positive is a word you've made up to talk about a red flag that can be resolved, isn't it?

A No. A false positive is not a word that I made up. A false positive is a common phrase among data scientists and statisticians.

Q Not in the realm of red flags and positive red flags; you'll find it nowhere, will you?

A So that I can't answer.

Q Thank you.

MR. LANIER: Thank you, Your Honor.

THE COURT: All right. Okay, Doctor, thank you very much. We appreciate your testimony.

THE WITNESS: Thank you, Your Honor.

THE COURT: Safe travels back.

You may be excused.

All right, ladies and gentlemen, we will break for the evening. Usual admonitions apply. Do not read, view, listen, encounter anything about this case or anything close to it in any sort of media. Don't discuss this case with anyone.

Have a good evening, and we'll pick up tomorrow morning at 9.

(Jury excused for the day at 5:13 p.m.)

THE COURT: Okay. Please be seated for a minute. If someone could just close the back door, please.

MR. WEINBERGER: Your Honor, can I make a statement for the record before you --

THE COURT: All right.

MR. WEINBERGER: So we've been at this trial for four and a half weeks now, and we've heard Mr. Stoffelmayr complain about things we've done. And what I heard Mr. Stoffelmayr get up and say in front of this jury is that my colleague, Mr. Lanier, made a false statement regarding what Mr. Rannazzisi said, when in fact the testimony of Mr. Rannazzisi is exactly what Mr. Lanier said.

MR. STOFFELMAYR: Completely -- I cannot believe you would say that, Peter. I'm shocked.

MR. WEINBERGER: You said it was -- you're shocked? I'm shocked that you would accuse Mark Lanier of a false statement. You know better.

THE COURT: Hold it, hold it. First of all, first of all, I don't want any speaking objections or accusations like that just trolled out, all right?

So, Mr. Stoffelmayr, I think that's something you should have asked for a side bar, and if you wanted to say that, that's fine, but you shouldn't say anything like that --

MR. STOFFELMAYR: If I --

THE COURT: -- whether you think it's true or not.

MR. STOFFELMAYR: I do understand that. They're got different issues. That point I accept, and I apologize.

THE COURT: Okay. So that's important.

Now, you know, I haven't memorized everyone's testimony and I'm not tracking it, as Mr. Lanier says, as well as all of you are.

We actually got two full witnesses done today. That went faster than I thought.

So tomorrow, what do we anticipate from the defendants?

MS. FUMERTON: Your Honor, in the morning we're calling Dr. Mark Glickman. He's an expert.

THE COURT: Dr. Glickman?

MS. FUMERTON: Yes, sir.

THE COURT: All right.

MR. DELINSKY: After Dr. Glickman we'll be calling Robert Hill, Your Honor, who is an expert for CVS.

MS. FUMERTON: Your Honor, we have two deposition clips we still need to play. One is about 22 minutes and --

MS. SWIFT: It's about 65, 64 minutes.

MS. FUMERTON: Just over an hour.

THE COURT: All right. Well, we'll -- again, it's hard to predict how -- I mean, I didn't think we'd actually get through two experts today, but everyone was very efficient, so that's good.

Okay. Fine. I guess tomorrow morning we want to take up the Harrington documents that CVS offered. The plaintiffs wanted a little time to look at it.

I don't know if there are going to be any documents with Dr. Murphy. We should take those up, and also Dr. Choi, so if people can look at those so we can stay current. I don't know -- with experts, I don't know what documents everyone is really planning to offer.

MR. HYNES: Your Honor, Paul Hynes for CVS.

I think if plaintiffs are okay, we can take up the Harrington exhibits now.

THE COURT: I don't know if they're ready.

MR. WEINBERGER: We still have to discuss your first exhibit.

MR. HYNES: Okay.

MR. WEINBERGER: Right?

THE COURT: We can put that to the side, Peter.

MR. WEINBERGER: And then we have no objections to the rest of the exhibits.

MR. HYNES: Okay.

THE COURT: All right. All right, fine.

MR. HYNES: With the exception of the first one, Your Honor, and I marked two on here that were already admitted. The others can be admitted. If you'd like me to read them out, I can.

THE COURT: I'll read them. That's okay.

So these come in without objection.

MR. HYNES: Right.

THE COURT: 01727, 01728, 00266, 00854, 00945, 00906, 00980, 01104, 01263, 01393.

MR. HYNES: And all of those were CVS-MDL.

THE COURT: Okay. And 15601, and then 20699.

MR. HYNES: Right. And both of those were P-dash.

THE COURT: P-dash, all right.

MR. HYNES: That's all of them. Thank you, Your Honor.

THE COURT: Okay. And then, all right, fine. Then we'll -- remind me, we'll come back on the TRO.

MR. HYNES: Yes. We will consult with plaintiffs on that and the *Holiday* decision, and report back to you.

THE COURT: All right. Okay. Good. So then we can take up tomorrow morning whatever documents people want to offer with Drs. Murphy and Choi.

Okeydoke. Have a good evening everyone.

Oh, I had for the time, 5.25 for defendants and 1.0 for plaintiffs, so 6.25 total.

(Proceedings adjourned at 5:19 p.m.)

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C E R T I F I C A T E

I certify that the foregoing is a correct transcript of the record of proceedings in the above-entitled matter prepared from my stenotype notes.

/s/ Lance A. Boardman *11-04-2021*
Lance A. Boardman, RDR, CRR DATE